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JANUARY 2001

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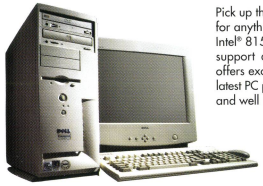
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Pick up the Dell Dimension 4100 and you'll be ready for anything. With 866MHz of power and the latest Intel® 815e chipset featuring up to 4X AGP graphics support and 133 MHz FSB, the Dimension 4100 offers exceptional expandability and support for the latest PC peripherals, with high-end performance now and well into the future.

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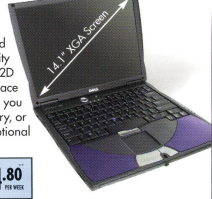
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- 64MB SDRAM ■10GB† HDD
- 8MB 2X AGP Video
- High-fidelity Audio SoundBlaster Compatible
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- Intel® Pro 100+ NIC
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- 56K Modem
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- 3-Year Limited Warranty
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- 24X Max CD-ROM ■ Carry Case
- High-fidelity Audio SoundBlaster Compatible
- 14.1" XGA Screen ■ 2.36kg
- Microsoft® Windows® Millennium Edition
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- 1-Year Limited Warranty (Next Business Day On-Site* Response With International Coverage*)
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- Integrated Intel® Pro 100+ NIC
- Integrated Ultra3/LVD SCSI Controller
- 20/48x EIDE CD-ROM Drive
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- Integrated Single Channel RAID Controller (optional)
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- 3.5" 1.44MB Diskette Drive
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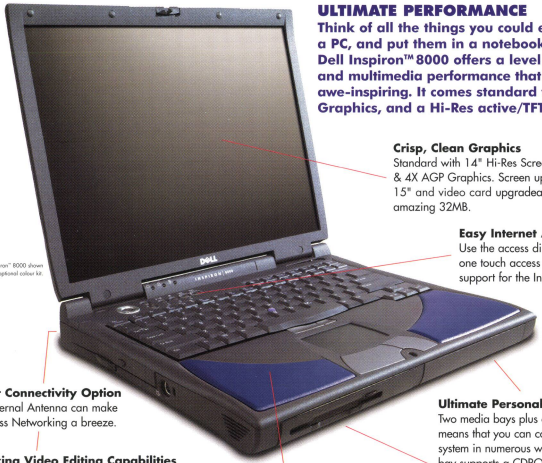
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**Crisp, Clean Graphics**
Standard with 14" Hi-Res Screen (1400x1050) & 4X AGP Graphics. Screen upgradeable to 15" and video card upgradeable to an amazing 32MB.

**Easy Internet Access**
Use the access direct buttons for one touch access to Dell Technical support for the Internet or email.

**Great Connectivity Option**
The internal Antenna can make Wireless Networking a breeze.

**Amazing Video Editing Capabilities**
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**Great Looks**
Optional Colour 'snap-on' kit for palm rests. Choose from Storm Grey, Tahoe Blue, Purple, or Yellow.

**Ultimate Personalisation**
Two media bays plus one fixed bay means that you can configure your system in numerous ways. The fixed bay supports a CDROM, a DVD or a CDRW. The configurable media bay supports a CDROM, a DVD, CDRW, second battery, a zip drive or a floppy drive. How will you configure yours?

## DELL INSPIRON™ 8000 G700XT NOTEBOOK

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- 64MB SDRAM
- 8MB ATI Mobility M4 4X AGP Video
- 10GB[1] HDD
- High-fidelity Audio SoundBlaster Compatible
- 8X DVD-ROM
- 14.1" SXGA Screen
- 3.5" FDD
- Microsoft® Windows® Millennium Edition
- Microsoft OEM Works Suite 2000
- 56K Modem
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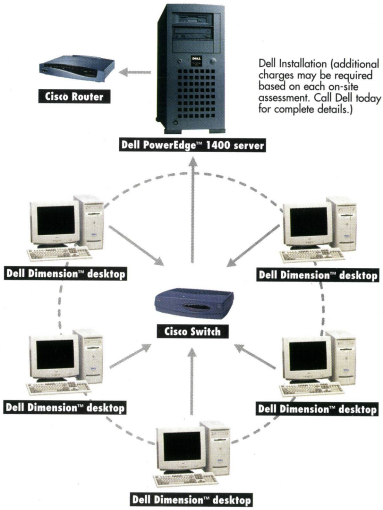
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- Cisco 800 Series Router with IP Firewall Software
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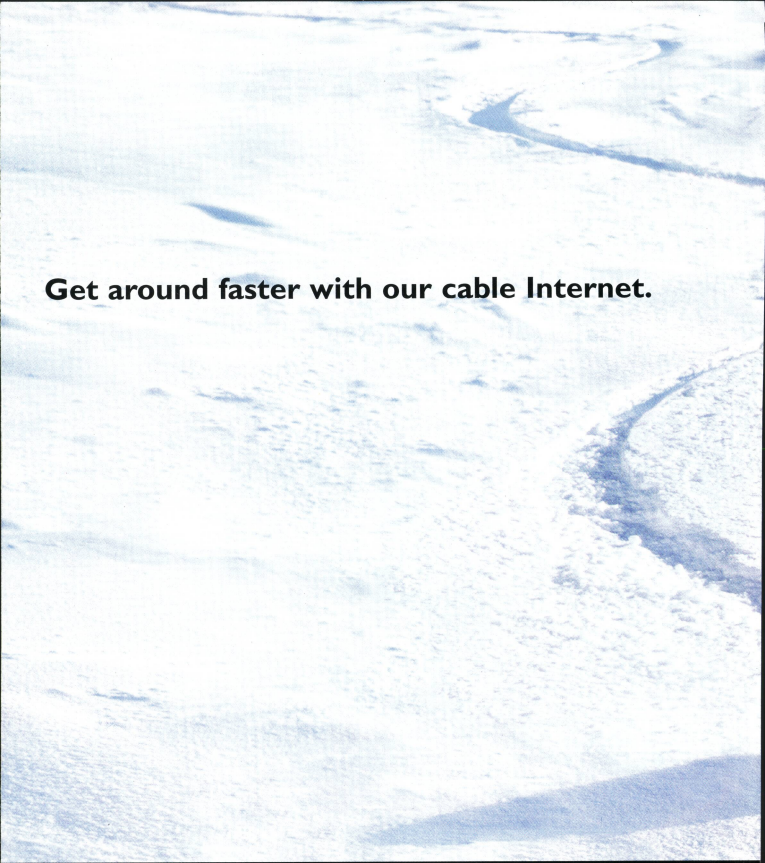
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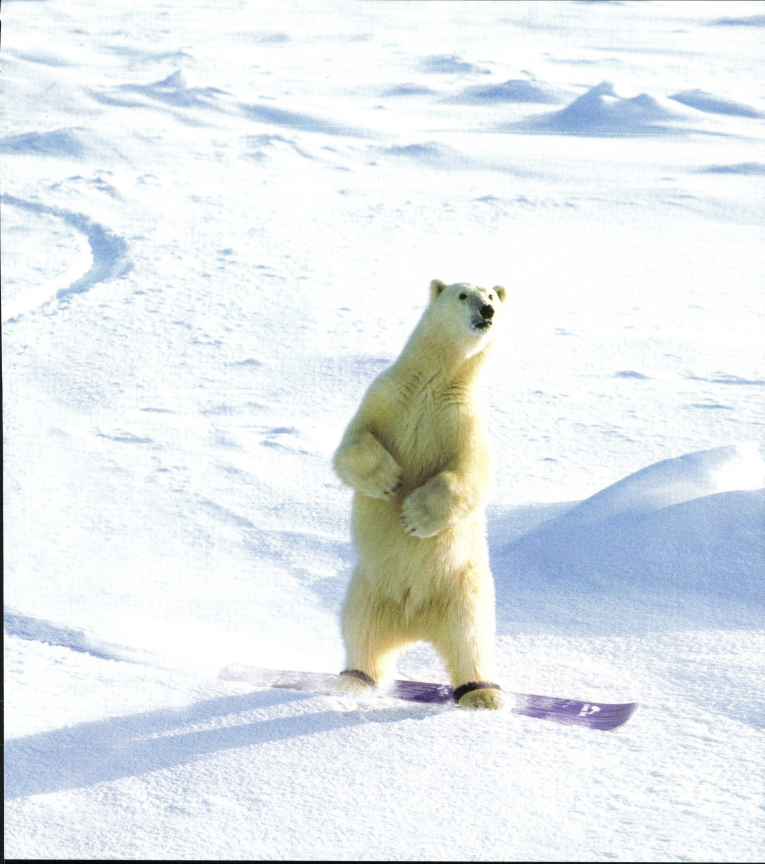
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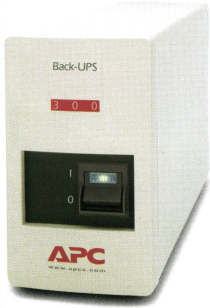
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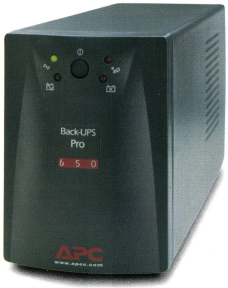
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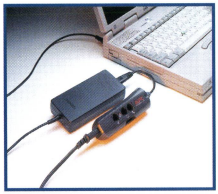
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## ARMADA 100s

The Compaq Armada 100S series of notebooks have been created specifically to answer the needs of small business, at a price point that is sure to make you take notice.

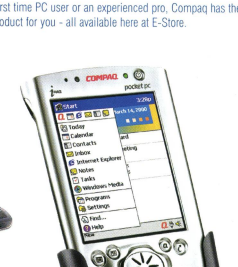
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## Contacting *APC*

For general queries and comments, email is *APC*'s preferred means of communication:

**apc@acptech.net**

You can also use the feedback form on our Web site:

**apcmag.com/feedback**

### Reader enquiries/back issues

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**Phone** (02) 9288 9123

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**Fax** (02) 9264 6320

We run out of most issues quickly, so please contact Akiko Suzuki before sending a cheque.

### Cover CDs

If you have any problems with our cover CDs, refer to the Help section on the back of the CD insert.

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Media releases can be emailed to newswire@acptech.net. Please note that due to the volume of mail we receive, we are unable to confirm receipt of releases.

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For full details see our subscription ad on page 128.

## Editorial submissions

Please let us know if you have an idea for an article or review you'd like *APC* to cover.

If you'd like to write for *APC*, please email apc@acptech.net a brief résumé with an outline of your experience and interests, a sample of your writing and an outline of the article you have in mind. We appreciate submissions, but can't guarantee a reply.

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# WANT TO SEE YOUR COMPUTER FLY?

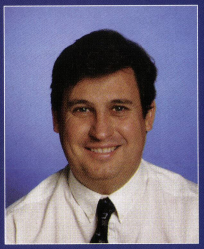


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**Glenn Rees**

Glenn Rees is publishing director of ACP Tech and can be contacted at apc@acptech.net.

*The basic strategy behind successful Web publishing is easy. So why is implementing it so difficult?*

# Online challenges

Well, another year passes with *APC* maintaining its top-selling position among Australian IT magazines, thanks to you, our loyal readers, and the talented and dedicated team who write and produce the publication.

You might ask, why wouldn't we be dedicated when we have jobs like Jeremy Torr's, who on page 70 of this edition looks at some very cool and innovative new gadgets.

Actually, even fun projects like this require much more work than you might think. Writing and producing *APC*, its cover CDs and Web site month after month, to quality that our readers have come to expect, requires an enormous amount of planning, talent and sheer hard work.

One gadget that caught my eye, the intriguing eBookMan, is reviewed in First Take this month on page 44. Of course, ebooks aren't a new concept and the eBookman isn't going to spark an instant revolution; ebooks have a long way to go before they will compel the majority of us to abandon print publications, which remain vastly more usable and rugged. Nevertheless, ebooks will become increasingly popular and it's only a matter of time before you'll be able to download all your favourite magazines and newspapers from the Net.

This is just one of the huge challenges facing both old and new media players. There's no question that some expensive mistakes have been made with Internet publishing, but there have been some successes too. As I keep reminding people, the Net is only about five years old as a mass medium, and a period of trial and error was inevitable.

On page 78, former *APC* editor Jeremy White puts it all in perspective. As the driving force behind the launch of *APC*'s cover CDs and Web sites, Jeremy is one of the best qualified people to look at the successes, failures and future strategies of online publishing.

As I see it, these strategies apply to all Web sites, not just those of media companies, and the basic strategy behind a successful Web site is very simple: it's essentially useful to the visitor.

Take **apcmag.com** as an example. It's Australia's most popular IT site because it provides two simple but useful services: a huge, searchable archive from Australia's most respected IT magazine; and **apcstart.com**, a simple but useful directory of links on one fast-loading page.

The hard part is coming up with a creative concept that will make your site useful and complement your business. Harder still, you have to deliver what you promise.

> Web publishers and advertisers are facing remarkably similar challenges online.

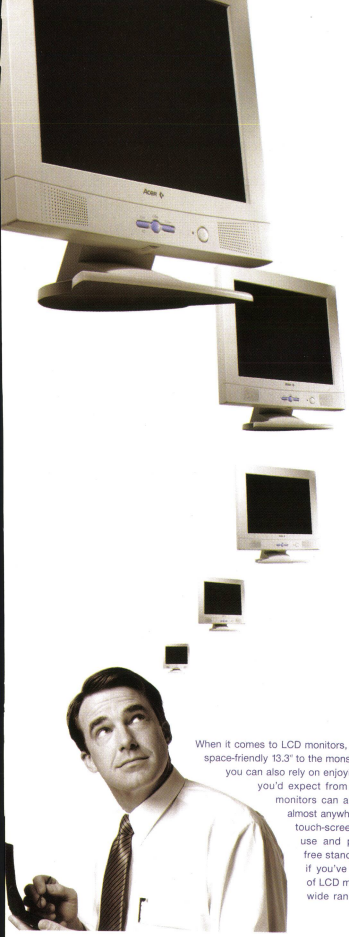
Then there's the critical question: how do you turn popularity into profits? The main problem facing Web publishers is their reliance on advertising for revenue. Unlike print publications, very few Web sites make any money from charging to view content.

Without question, this is a challenging time for Web advertising gurus, who are having to come up with creative new ways to offer better value to online advertisers.

I don't subscribe to Sebastian Chan's view on page 54 that no-one actually clicks on Web banner ads. Some advertisers are happy with their banners' click-through rates, but as Sebastian says, others aren't.

What's the problem? I believe the same rules that apply to editorial Web content also apply to advertising. You can't just put a witty slogan and nice graphic in a banner and expect a huge response. You have to offer a genuinely useful product or service on the Web, all in the limited space of a banner ad, but the same applies to Web ads and promotions of all shapes and sizes.

All this means that Web publishers and advertisers are facing remarkably similar challenges online.



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Acer

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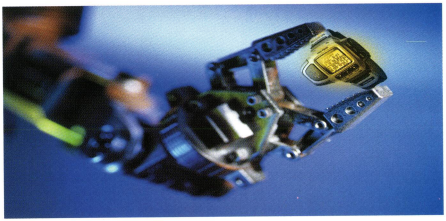
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200 **Chip Chat**
Not sure what the year ahead will bring? Look yourself up in *APC*'s e-horoscopes


## FETISH GEAR Gadgets galore



**Forget grey boxes with gargantuan gigahertz** — portable, connected and great-looking gadgets are cool this summer. From a wrist-watch organiser to an MP3-playing camera, *APC* checks out the hottest new gadgets.

70

## PENTIUM 4 Worth the wait?

**Intel has finally released the Pentium 4** amid claims of unparalleled performance and features. Has it really been worth the wait? *APC* Labs tests the new chip to separate fact from fiction.

In First Take 30

## INSTANT THEATRE DVD home theatre systems

**Buying a DVD player for your TV is a good start,** but for the true home cinema experience, you need realistic, room-shaking audio. *APC* kicks back, relaxes and 'tests' a range of DVD home theatre systems.



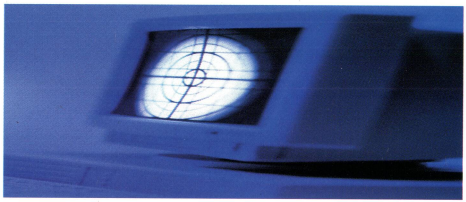

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## DEVELOPMENTS The best and worst of 2000

**Exciting new releases and major disappointments** combined to produce a memorable year for computing. We reward the best products in our annual awards feature — and throw a few brickbats at the duds.

62



## IN THE LINE OF FIRE

**Games controllers can be fun when they work,** and agonising when they don't. *APC* experiences the highs and lows with 17 games controllers.

92

## DIGITAL TV One big yawn?

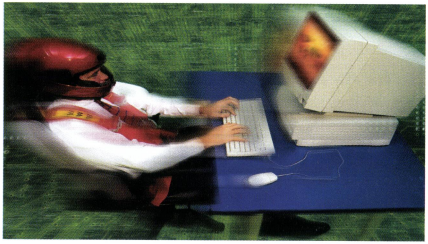
**Digital TV transmissions begin this month,** but few people are likely to take advantage of the new service right away. *APC* examines why.







In Newswire 28



## TERMINAL VELOCITY Thin client technology

**Though they've failed to live up to industry hype,** thin clients have been quietly transforming the corporate computing landscape. *APC* looks at four super thin client services.

In Corporate IT 108




## OUTTA SPACE

**Online storage allows you to save files online** and then access them from almost any Web-enabled device. *APC* reviews the major providers in this rapidly growing market.

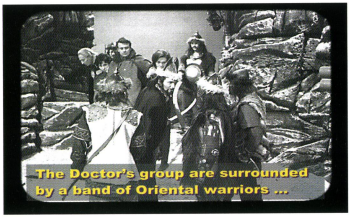
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## KEEP OUT
## Personal firewalls

**Big business has been concerned about Internet security for years.** Home users are becoming equally cautious, and there's now a bevy of so-called personal firewalls to choose from. *APC* puts some to the test.



102




## JUST DIY New age cybermen

**What do you do when your favourite TV show is consigned to the scrapheap?** Reconstruct it yourself, using your PC of course. One *Doctor Who* fan shows you how.

In Workshop 130

## YOU WOULDN'T READ ABOUT IT

**Media companies are struggling to find ways** to make the Internet pay. Is this a short-term problem?



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# THE SAV E-STORE

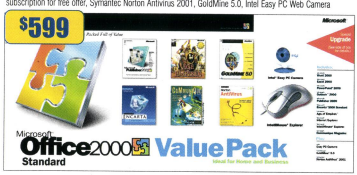
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### MICROSOFT AGE OF EMPIRES 2.0

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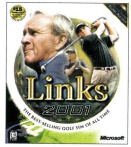
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$74

### Combat Flight Simulator 2

WWII in the Pacific challenged pilots and machines as never before. Combat Flight Simulator 2 takes you back to this historic time and place with exquisitely detailed aircraft, cockpits, and scenery.




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### MS Links 2001 WIN32

This New version of the best-selling golf sim will feature an entirely new rendering engine that delivers unprecedented ball physics and graphics. Improvements to Links 2001 include new four players and courses, new golfer animations and personalities, customizable club distances that allow for an even more accurate re-creation of a player's actual game and faster and easier online play.

### Game Listings

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Price: ..... $42

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# 2CDs

## What's hot on *APC* January CDs

For a complete list of programs featured on the January CDs, see the CD sleeve.



## Best Games of 2000

Kick back and enjoy the fun as *APC* reflects on PC gaming in 2000. We've got demos of some of the best games from the past 12 months, including Deus Ex, Homeworld: Cataclysm, Thief II: The Metal Age, Vampire: The Masquerade — Redemption, Soldier of Fortune and Crimson Skies. As part of the package, we've also thrown in *APC*'s worst game ever and provided a couple of the latest demos to hit the market.

## Borland JBuilder 4 Foundation COMPLETE VERSION

We featured JBuilder 3.5 Foundation on our cover DVD in October. By popular demand, *APC* has included it again, but this time we have the latest version for you! This is an all-Java environment for developing and deploying Pure Java 2 applications on the platform of your choice. You will find the complete version of JBuilder 4 Foundation on CD 1.

*To obtain a serial number for JBuilder 4 Foundation go to: www.borland.com.au/apc/jbuilder4*

Borland JBuilder 4
Pure Java. Visual Development. JAVA 2

## Netscape 6

Netscape

The long-awaited update of the Communicator browser suite has finally been released. The company has dropped the name 'Communicator' and now the entire suite is called Netscape. You can find Netscape 6 for Windows, Mac and Linux on CD 1.

## Don't Get Burnt

CD 1 also offers a choice of personal firewalls for protecting your system.

Specifications from the reviews of DVD home theatre systems can be found on CD 1.

**Plus** all our regulars, including our Patch Panel section, MP3 tracks and a selection of shareware reviewed by our OS specialists.

## Competition winner

Mr J Tiley of Carlingford, NSW was the lucky winner of our November 2000 subscription promotion. He is now the proud owner of a Sony N50 LCD monitor valued at $3,079. Congratulations!



## Your guide to the cover CDs

The *APC* cover CDs complement the magazine and **apcmag.com**. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and Web browsers.

Each piece of software includes instructions on whether you need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included on the CD cover.

The CDs have been created in HTML. You do not need any special software to access the CDs, other than a standard browser.

The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the CDs is provided as is, without any warranty, expressed or implied. Complete terms and conditions are included on the CD; click on the Conditions of Use link for details.

## How to run the CDs

Before using the CDs, please read the Conditions of Use online at **apcmag.com/apcmag.cd**. These CDs use an Autorun feature for Windows 95, 98 and NT systems. Just insert a cover CD and your browser will automatically load with the *APC* CD front page. Users of other platforms can simply launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD. For further information, see the instructions on the back of the CD insert.

You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus check every program before use.

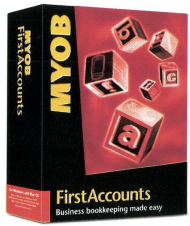
While *APC* has taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

If you have any problems, refer to the Help section on the back of the CD insert.

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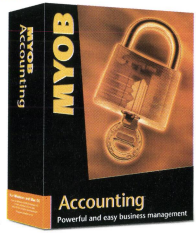
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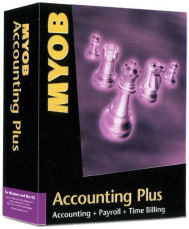
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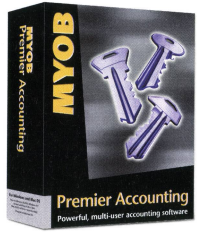
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# LAUNCH ISSUE







# ON SALE NOW

# New Internet domains




The wait is finally over. Seven new Internet domains have been approved to alleviate pressure on the overcrowded .com space favoured by businesses around the world.

The seven domains chosen by ICANN are .biz for businesses, .name for individuals, .pro for professionals, .museum for museums, .aero for aeronautics, .coop for business cooperatives and .info.

The new international domains, called top level domains (TLDs), must still be approved by the US Commerce Department's National Telecommunications and Information Administration. If this goes ahead it will be the first time new generic TLDs have been added since the introduction of .com, .net and .org.

The .biz domain was partly sponsored by local registrar Melbourne IT, which is now expected to play a key role in managing the new domain. Melbourne IT will register the domains with a US partner under the registry name NewLevel, LLC, and expects to begin registering .biz domains in mid-2001.

At least five different companies competed for registry rights to .biz, which is expected to be the most popular of all the new domains. The only other Australian applicant for TLDs was Canberra firm Rathbawn Computers, which proposed at least seven domains including .sex and .wap.

Among the proposals rejected by ICANN were the widely discussed .kids domain for child-friendly content and .xxx for adult content. The former was dismissed on the grounds that no applicants had a technically feasible method of ensuring that content in such a domain would be appropriate, while the latter was rejected because no means of forcing existing adult content to migrate to the new domain was proposed.

Other proposals for domains such as .fin and .travel weren't successful as they did not demonstrate a true representation of the industries they hoped to cover. Many of the more unusual TLD applications were removed from consideration because they lacked demonstrated financial backing.

Applications from large companies such as Nokia and Novell were also rejected. Novell's proposal for a .dir directory management domain was partly accepted, but the report criticised its exclusive reliance on Novell's NDS directory service.

In related news, the Australian domain authority (auDA) is preparing a new competition policy for the .au space. The new policy will aim to eliminate the current monopoly on registering .au domains, and should be ready by the second quarter of this year.

auDA's new chief executive officer Chris Disspain said the review process must find a way to increase competition while dealing effectively with problems surrounding domain name disputes and naming policies. "The challenge for me is to maintain a balance between commerciality and regulation," Disspain said.

Before the new policy can be put in place, auDA needs formal recognition from global domain authority ICANN. "In practice we may be ICANN's delegate, but formally we are not," Disspain said in October.

Disspain also responded to claims the review process has taken too long, saying the delay was unavoidable. "Most of the people involved in auDA know that there is a perception that things have gone quite slowly . . . The process could be more efficient and it's my intention that it will be," he said.

Melbourne IT has given $659,000 to auDA, ensuring it will be the exclusive registrar of .com.au domains until the competition review is complete. "Melbourne IT's influence over auDA is not in any way governed by the amount of money they put in," Disspain was quick to point out. "They have no more and no less influence than anyone else," he said.

***William Maher and Angus Kidman***

## News contents

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# News roundup

## dstore bought out

Australian retail chain Harris Scarfe has bought out online retailer dstore. Financial details were not disclosed, but reports have valued the deal at between $3 million and $8 million. The deal is a major win for Harris Scarfe which belatedly announced its ecommerce initiative in August 2000. The company intends to restructure dstore with a view to making it profitable in the first half of this year. As part of the dstore acquisition, Harris Scarfe inherits a 20% shareholding in wishlist.com.au, and a 50% share in eFill and Home Delivery. dstore senior executives have resigned, including CEO David Gold. It is believed Harris Scarfe will maintain the dstore brand.

## Missing children

An Australian girl missing since 1963 is one of 3,000 children listed on a new site by the National Missing Persons Unit under the umbrella of the International Centre for Missing and Exploited Children. The site will be used to track down children illegally removed from Australia, usually by a parent. With the permission of the child's family or the Family Court, details on missing children will be made available at www.au.missingkids.com. Online records will be maintained indefinitely, and to date, 13 missing Australian children are listed. The online search for missing children began in the US in 1997 and now spans 10 countries. Computer Associates supports and maintains the network's technology.

## News realestate deal

News Limited has bought a 44.2% stake in online property site realestate.com.au. News Ltd is hoping to tempt property buyers away from print ads and towards online virtual tours. Under the terms of the deal, News Ltd scores 40 million shares with an option to purchase a further 10 million over the next five years. Worth $10.75 million, the stake in realestate.com.au will be paid for with $2.25 million in cash and the remainder in advertising and marketing services.

# IBM claims PC top spot

IBM has taken the number one position in the Australian PC market for the first time. Having played bridesmaid to Compaq for several years, the Big Blue has narrowly beaten its competitor to claim 14% of the local market for PCs, notebooks and standard Intel architecture servers (SIAS). Compaq was relegated to second position with a 13.6% share in the third quarter of 2000.

According to research company IDC, IBM has not held the top spot locally since at least 1994. IDC senior analyst Logan Ringland said IBM's spurt could be attributed to its "very successful" Virtual Communities venture with the ACTU (see APC January 2000, page 17), and the fact that corporations waited until the introduction of the GST to buy computers. IBM also increased its local profile after being the major sponsor of the Sydney 2000 Olympic Games.

Dell (in fourth position) showed the highest sequential growth. Sales were strong and a deal with the ANZ bank pushed its PC sales up. Toshiba, ranked fifth, also had a solid quarter, registering a 33% increase in sales for the same period last year.

Hewlett-Packard was not so lucky, with its server market share "taking a bit of a hammering" according to IDC, but the company still managed to maintain third position. Last September the company announced 'Superdome', an initiative to kickstart its ailing server business.

Some 627,500 units shipped during the quarter, with desktops accounting for just over half a million of these. Notebook sales were the highest ever at 110,000 units, and over 15,000 SIAS units were also sold. The figures represent a 7.8% sequential growth rate, but IDC warns that processor and hard drive shortages will affect the market in the coming months.

*Roulla Yiacoumi*

# Authorities warn of Net scams

The Australian Competition and Consumer Commission (ACCC) has joined the US Federal Trade Commission (FTC) in a year-long crackdown on Internet scams.

According to the FTC, some ISPs go out of their way to defraud customers of money. In one case, people were tricked into signing up with an ISP when cashing in 'rebate' cheques they received in the mail. Once connected, it was almost impossible for the victims to cancel the charges.

In another scam, dubbed 'Web cramming', thousands of Internet users received credit card and phone bills from adult Web sites they claimed they didn't visit.

From 285,000 consumer complaints filed with the FTC, worldwide authorities pursued 251 Internet scams, some relating to health care, telephone bills and even travel. Many Australians have been victims of such schemes. The Australian Securities and Investments Commission (ASIC) is pursuing over 50 companies allegedly developing illegal share trading software.

ASIC alleges that these companies are distributing the software in breach of the Corporations Law, which requires that anyone who provides investment advice must first obtain an Investment Advisers Licence. ASIC considers share trading software illegal if it produces information that acts as an 'indicator' which in turn presents investors with a 'trigger to buy or sell.'

In November, ASIC blocked Australian software company Share Trend from marketing or selling stock-tracking software. ASIC alleges that Share Trend breached both an enforceable undertaking it made to ASIC and Australian Corporations Law by promoting the software at a recent investment expo. According to Share Trend's Robert Szatmari, the company has been selling the software for six years and has only received six complaints, four of which were resolved. When APC spoke to Szatmari, he was looking forward to the hearing, set for early December, as the Supreme Court would decide then whether to continue permanently blocking the software.

There are stiff penalties in store for online scam artists. In October last year, Steven Hourmouzis was sentenced to three months' jail for using the Internet to artificially inflate the share price of a US technology company. After his release, he will serve a $500 two-year good behaviour bond.

Following the sentence, ASIC issued this warning to Internet scammers: "People should be aware that ASIC has the ability to trace the authorship of messages published on the Internet."

*William Maher, Howard Dahdah and Fiona Angus*




Actual size

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CPH 328/3 APC

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# News roundup

## Cisco snaps up Radiata

Australian wireless networking supplier Radiata has been acquired by technology giant Cisco. The $US295 million buyout will see Radiata's chipsets incorporated into Cisco's wireless LAN products. Radiata's 53 employees will join Cisco's new wireless networking business unit. Existing wireless LANS provide 11Mbps data transfer at 2.4GHz, but Radiata technology can be used in devices operating at 5GHz. Radiata was founded in Sydney in 1997 and developed its technology based on research by the CSIRO and Macquarie University. It claims its semiconductors can be used in wireless networks with data speeds of 54Mbps.

## Napster settles with BMG

In a major turnaround, file-swapping service Napster has reached a settlement with one of the 'big five' record labels that sought to have the service shut down earlier this year. Napster has announced a settlement deal with German music giant Bertelsmann, whose BMG music division, along with EMI, Polygram, Sony and Warners, has been involved in an ongoing court battle with Napster. The two companies will form a subscription service to distribute music from artists signed to BMG. Senior executives at BMG resigned a week after the announcement.

## HP dumps PWC bid

Hewlett-Packard has abandoned its $US18 billion bid for the consulting arm of PricewaterhouseCoopers. HP revealed the cancellation in mid-November, just two months after announcing the proposed deal. "I am unwilling to subject the HP organisation to the continuing distraction of pursuing this acquisition any further," said CEO Carly Fiorina. "We remain committed to aggressively growing our consulting capabilities, organically and possibly by acquisition, and are open to other business arrangements to achieve our goals." Following a worse than expected fourth quarter, Hewlett-Packard's announcement was received coolly by the stock market with a dip in its share price.

# Government online tendering

A trial of electronic tendering and a decision by the States and Territories to adopt Gatekeeper digital certificates has brought Government departments closer to conducting business online.

The trial, which began in November, allowed bids for government tenders to be submitted online using a Web browser. Five federal agencies took part in the trial: the Department of Communications, Information Technology and the Arts; the Department of Veteran's Affairs; Centrelink; the Australian Tax Office and the Department of Finance and Administration.

The system, called the Commonwealth Electronic Tender System (CETS), was to be trialled for several weeks in November before the Government decided whether to introduce it. At the time of writing, security provider eSign Australia was awaiting full Gatekeeper accreditation, which would allow it to issue digital certificates to anyone conducting business online with the government.



Meanwhile, State and Territory governments have agreed to adopt Gatekeeper technology when they eventually move online. This means they will use government-approved digital certificates issued by Gatekeeper-accredited third parties such as eSign or Certificates Australia.

The announcement is sure to mean a surge in interest in Gatekeeper among third party security vendors. Gatekeeper has already drawn vendors such as eSign to Canberra in the hope of securing lucrative digital certificate contracts with government departments. In November 2000, the Gatekeeper Internet site listed 13 companies waiting for entry-level Gatekeeper accreditation.

## First up

eSign's rival, Certificates Australia, took the honour of being the first nongovernment authority to receive full Gatekeeper accreditation in November last year. The announcement ended a two-year application process. Certificates Australia is not the first certificate authority (CA) to receive full Gatekeeper accreditation. That distinction belongs to the Australian Tax Office (ATO), which also became a fully accredited CA in November 2000.

Interestingly, the ATO uses digital certificates provided by Baltimore Technologies, which owns Certificates Australia. The ATO issues certificates to all businesses that pay their business activity statements online.

At the time of writing, Baltimore had two government public key infrastructure (PKI) contracts: the ATO and the Health Insurance Commission, which will soon be introducing certificates for the transfer of confidential medical information online. PKI allows companies to authorise online transactions using electronic keys. Baltimore is also involved in selling PKI to organisations such as Telstra, the ANZ Bank and PricewaterhouseCoopers.

Gatekeeper certificates are currently used when dealing with the Government, but Baltimore's Asia-Pacific managing director John Palfreyman said they also provide a model for PKI in the private sector.

Escalating interest in digital certificates has also lured US-based PKI software supplier Entrust Technologies to Australia. The company has opened its Australian headquarters in Melbourne and is considering an investment in Australian CA KeyTrust.

## PKI challenges

Despite sudden interest in digital certificates and PKI, the technology does not appear to be widely used in Australia at present (see 'Learning from the Microsoft crack', page 114). However, Entrust's vice president of global sales Rick Spurr is confident the technology will be popular. He predicts a fourfold growth in the local market between 2001 to 2002. Unlike PKI companies Certificates Australia and eSign Australia, Entrust does not act as a certificate authority itself.

Spurr's predictions are supported by the Forrester Research report, *Sizing the Security Market*, which predicts that spending on access control and application security will grow at an annual rate of 39% over the next four years. In a survey of 50 IT managers in global companies, digital certificates and associated applications were the only technologies regularly mentioned as spending drivers.

***William Maher and Howard Dahdah***




Actual size

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CPH 328/4 APC

DIGITAL PowerShot Canon

# News roundup

## Microsoft pricing plans

Microsoft appears to be planning to offer its upcoming Office 10 suite as a subscription product, but it refuses to discuss the most important aspect of the plan: how much it will cost. Microsoft officials have said that a subscription version of Office, which dominates the applications market, will be released in the first half of 2001. The company had previously touted the possibility of a subscription model, perhaps along application rental lines, but hasn't provided specific dates. Under the retail plan, customers could purchase a discounted copy of Office 10 from conventional retailers. Each year they would have to renew their subscription by purchasing a new copy on CD or by re-registering the software online or by phone.

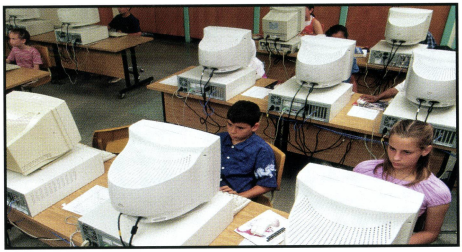
## SDMI fails first test

Hackers have been offered a $10,000 reward if they can hack into new secure music technologies under consideration by the commercial recording industry. The Secure Digital Music Initiative (SDMI) launched a public challenge to see if six security models proposed to protect digital music could be broken. In October, SDMI announced that 447 challenges were submitted, but no money has been paid out yet. "At this point, no conclusion can be drawn regarding the success or failure of any attempted challenge, " reads a statement on its site. Web site Salon reports that the watermarking systems used by SDMI were successfully broken, suggesting the system needs improvement.

## Virgin Mobile takes on Oz

Richard Branson has launched his Virgin Mobile service in Australia, and has hinted that an ISP could also be in the works. The Virgin CEO unveiled the 'no contracts' service in Sydney last October, declaring the company would set mobile phone users free. Virgin Mobile has no monthly contracts but consumers must spend a minimum of $15 per month and pay a 15 cent flagfall per call. There are no charges for voicemail, but itemised billing costs $2.50.

# P&C pitches pricey Net deal to schools



The Federation of Parents and Citizens Associations of NSW is looking to raise almost $1 million by selling pricey PC and Internet packages in NSW Government schools.

The nonprofit organisation has struck a deal to promote the products and services of children's Internet service provider Kidz.net.

The packages are significantly more expensive than rival community PC packages, such as those offered by Virtual Communities or the NSW Labor Council. They're also much more costly than many retail products.

Kidz.net chairperson John Landels said the company is hoping to extend the venture to the Catholic and Independent school sectors, as well as to P&C Associations in other states. "The P&C is the most effective marketing tool we could dream of," he said. "We hope that this is the beginning of a very large distribution arrangement through schools."

The federation will sell two different PC packages. The first package is priced at $2,227.50 up front, or $16.98 per week over a four-year period after a $99 deposit. The deal includes an Acer Aspire PC with an 600MHz Celeron processor, 64M of memory and a 10G hard drive. Internet access is only included for the first 18 months.

The second deal costs $3,075.60, or $23.76 per week over four years after a $99 deposit. The PC is the same as that offered in the first package, but has an 800MHz Pentium III processor and a 20G hard drive, as well as a larger 17in monitor.

Kidz.net is hoping parents will take up its filtered Internet product, which restricts access to 500,000 approved Web sites suitable for children between the ages of four and 14.

For every PC package sold, the P&C federation will collect a $40 commission from Kidz.net, and the school will take a $110 slice. P&C president Bev Baker said the deal with Kidz.net is the first commercial deal for the organisation, which represents the interests of parents and students of government schools. "The voluntary dollar is harder and harder to come by," she said. The P&C will distribute flyers at meetings and to teachers and staff to send home with students.

Baker estimates at least 10 people in each of the 2,000 government schools in NSW will take up the offer, netting the P&C a minimum of $800,000. If her estimates prove correct, schools will collect $2.2 million.

The fundraising scheme was launched in time for the Christmas season, and could provide a lifeline for the struggling ISP. Kidz.net made an overall loss of $3.2 million in the six months to June 30 after attracted revenue of just $45,000. Following its disappointing financial performance, Kidz.net closed down its UK operation, promising a significant boost in sales during the next six months. The company also announced a business "restructure" in November, which included unspecified "personnel changes".

*Fiona Angus*

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*The company has stuck by its promise to wipe out heavy broadband users.*

# Optus boots off first cable customers

Sticking to its promise to ban bandwidth hogs from its service, Optus@Home has kicked off its first batch of disobedient customers. Over 50 subscribers had their contracts terminated in mid-November, and have been banned for life.

In a move to reduce network congestion due to overuse by a limited number of users, Excite@Home Australia (the joint venture company which operates Optus@Home) announced in October a new 'self-regulatory' system to monitor use of its cable service. Optus had introduced its service less than a year earlier, in December 1999.

Subscribers were informed that they could not exceed 10 times the 'average customer usage', a figure determined by averaging the download usage of all subscribers over a rolling 14-day period. The highest and lowest 5% of users are excluded from the equation. Users are required to monitor their 'NetStats', usage statistics which determine their download limit based on how much others have downloaded.

Excite@Home CEO Chris Chapman said the new regime had worked well so far. "It's been exceptionally well received by subscribers who understandably were a little anxious at first that we were up to no good and trying to screw people," he said.

Declining to name exact figures, Chapman said between 50 and 99 subscribers had their service terminated. "We're talking double digits," he said, a figure the company was anticipating. "We didn't want to lose customers and took steps to ensure those who had a high usage were notified by email in the days leading up to the final day. About 80% pulled the reins on their usage, but 20% did not."

## Not happy, Optus

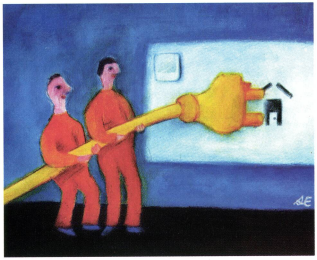
Contrary to Chapman's claims, a number of Optus customers have expressed dissatisfaction with the new regime.

Melbourne subscriber Dean Thomas was permanently disconnected from the service in November. A shift worker, Thomas subscribed to the service so that he could surf the Net all day and take advantage of the advertised 'unlimited' service.

"I wasn't given any notice. I was just disconnected," Thomas said. "And they have now banned me for life." On the day he was booted off the network, Thomas had downloaded almost 600M.

Thomas said he would "sit back and wait a while" for more appealing BigPond and Primus cable deals to appear, but there would be one condition: "I am not going to sign anything with an acceptable user policy. I would rather have no cable service than a cable service with limits on it."

Optus was later chastised by the Australian Competition and Consumer Commission (ACCC), which found the company's claims of unlimited access unacceptable. "This product was advertised as unlimited and was targeted at high-end users, yet Optus used the presence of an acceptable user policy to terminate services to those very people to whom the product was marketed," said ACCC chairperson Allan Fels. Optus was forced to compensate customers and offered full refunds to affected subscribers.



Subscriber Robert Durant (not his real name) shares the ACCC's sentiments, saying that as the service was targeted towards high-end users, the unexpected changes to the acceptable use policy were unfair. Durant believes that with the onset of ADSL, Optus wanted to kick off its high-end cable users to allow the company "to make a profit" with its low-end cable users.

Durant said he has to check his NetStats each morning to "get a feel for" the bandwidth he can consume. He said there were three or four days during which he was seriously over the average user limit. This meant he had to scale back his usage for the remainder of the 14-day period.

To another Optus@Home subscriber, Tony Antoniou, the NetStats system is far from satisfactory. "NetStats is a big concern," he said. "I suspect they will keep chopping off the top use figures, until the average is very low."

Antoniou's other major complaint is with the service's consistency. Antoniou signed up last July, believing he would be getting download speeds of over 50Kbps, but says he has experienced a very disappointing 5 to 10Kbps. "I am not paying a cent until I see some improvement," he said.

## Banned for life

Richard of North Dandenong in Victoria said he signed up to Optus@Home based on the promise that he wouldn't have to worry about download limits. "This is what motivated me to get on the phone and sign up," he said.

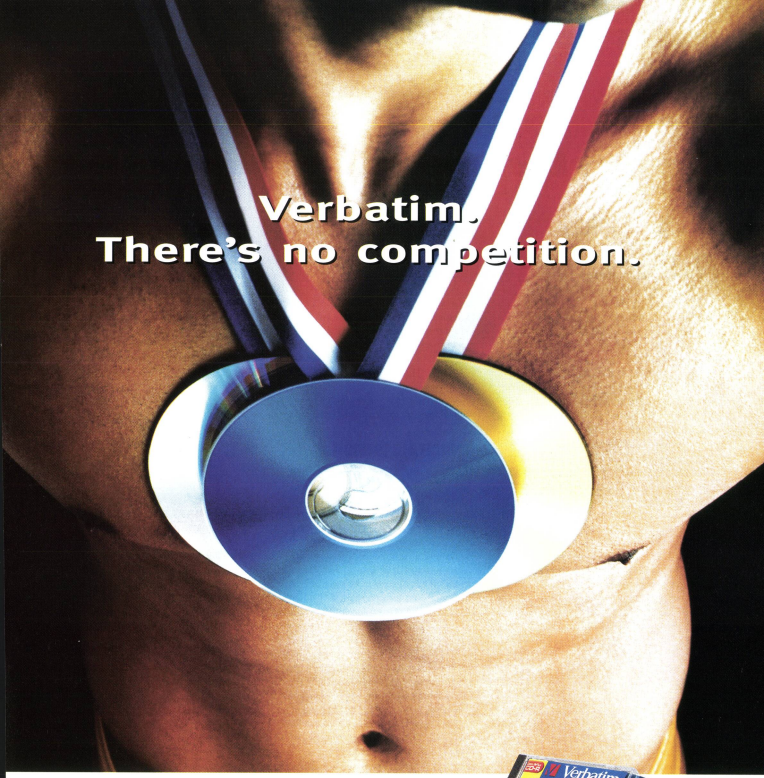
Rumours of subscribers being disconnected from the service began circulating in September, Richard said. "Then on September 27, my close friend's service was disconnected, leaving him with a cable modem and no Internet connection," he said. "As a 10-month subscriber to Optus@Home, I was disgusted to see such a tactic being used."

Optus claims the acceptable use policy is intended to stop heavy users burdening the network, but Richard believes Optus made the changes "to cut their costs".

What most irks Richard is Optus's life ban policy. "The thing that ticks me off the most is that if you get disconnected they can ban you from using Optus@Home cable Internet for life. Where in the contract does it say you go on a blacklist and you can never join up again?"

***Roulla Yiacoumi and Howard Dahdah***

Illustration by Erica Einarson




In the race to be the best quality CD on the market, Blue comes first. The Verbatim Blue Metal Azo CD is superior to Silver, and even Gold CD's, because of the unique combination of reflective surface and dye layer it offers. Verbatim CD's combine the strength of a silver reflective surface (which is more reflective than gold) and the durability of a unique Blue Metal Azo dye used by no other CD manufacturer. It's the dye layer that holds your data and determines how long your CD's will last, and because Silver and Gold CD's use only a clear dye, Verbatim Blue wins on all fronts, with flying colours.




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*The Internet has provided another opportunity for the major banks to slug consumers with extra fees.*

# Banks charge ahead with online fees

The National Australia Bank (NAB) has joined other major banks in charging online transaction fees, despite doubts over whether the Internet can deliver minimum service levels.

Two weeks before unveiling a $3.3 billion annual profit, the NAB announced that for the first time, it will charge customers for transactions made over the Internet. The NAB is the third of Australia's 'big four' banks to overhaul everyday banking services in the last six months.

The NAB tried to put a positive spin on the new online transaction charges by stating that it will reward customers who bank electronically. Under the new fee regime, one branch transaction is equivalent to 15 Internet transactions. Customers can forego flat monthly fees if they choose an account without entitlement to branch transactions.

Following the announcement, NAB managing director Frank Cicutto attempted to dampen community anger over excessive bank fees. "There is one myth I should dispel," he told a Melbourne briefing. "Fees on retail transaction accounts in Australia are a relatively small component of our overall fee income. In Australia, we currently collect about $254 million in personal transaction account fees. That is just 3.7% of our total income."

## Service levels

There is widespread consumer suspicion that electronic banking will not fulfill minimum service levels. Online banking may appear to be cheaper, but consumers still have to pay to access the Internet.

Cicutto acknowledged that Australian banks have an image problem. "Our bank and others have not done a good job of managing and meeting the service expectations of many in the community," he said.

Cicutto admitted that "a prime cause of irritation in regard to banks is our inability to achieve a balance between our need to modernise and community expectations about minimum service levels".

Westpac also revamped its fee structure in December, increasing the cost of a branch transaction by 25%. Like the NAB, Westpac stated that its aim is to reward customers for using the Internet because it is cheaper for the bank to provide financial services electronically. However, despite the savings in store, a spokesperson said Westpac will not provide free online transactions. "Each transaction costs us money," she said.

## Industry in turmoil

The ANZ and St George Bank have both decided to overhaul their business in an attempt to cash in on new technology. Despite the savings they will make on online transactions, the banks intend to keep their Internet fees at current levels.

Over the next 18 months, the ANZ will undergo what it is calling an "etransformation". It plans to split its existing divisions into specialist groups, with online banking becoming the centrepiece of the business.

According to ANZ ecommerce centre manager Sundi Balu, the bank will save money by integrating its systems and reducing the amount of paper involved in both internal and customer transactions. "The cost savings will ultimately translate into lower fees," he said. The ANZ reduced excess online transactions from 40 cents to 20 cents in May 1999, but currently charges $2.50 for excess branch transactions and 65 cents for excess ATM withdrawals. Despite projected savings, the ANZ is not planning to reduce fees again in the near future.

The ANZ has so far spent $20 million setting up its Internet banking, a figure Balu claims is modest compared to rival banks.

He said that the banking sector is in a transition phase as it shifts services online, and added that the ANZ has managed to overtake larger rivals by attracting Web-savvy customers to its online banking services, rather than trying to force existing customers to use the Internet. According to Balu, the ANZ has attracted a large number of full-time workers, who access the myanz.com service at work instead of lining up in branches during their lunch hours.

Sitting just below the top four banks, St George is getting ready for an overhaul which will see branches closed and staff cut by almost 1,500. The bank claims the changes will save it $87 million. It will sink an extra $56 million into new technology, which it believes will draw in an extra $115 million. St George stated that it intends to keep online transaction fees at current levels, despite increased profitability. It charges 20 cents or $1 for an Internet transaction, depending on the type of account.

## Which bank?

The only bank in the big four not looking to overhaul its online operations is Australia's most popular online bank — the Commonwealth Bank. It claims that one-third, or 500,000 of Australia's 1.5 million online banking customers, use its Web site. It has the highest online transaction fees of the big four, charging 40 cents per transaction.

However, the bank is quick to point out that unlike its major rivals, it does not charge account-keeping fees. "We see it as a fairer way for people who transact less," a spokesperson said. It claims that under its sliding-scale fee structure, 75% of customers pay no fees at all. The spokesperson said the Commonwealth has no immediate plans to overhaul its online operation, regardless of the changes sweeping through the industry.

*Fiona Angus*

| | Number of free transactions | Excess Internet transactions (each) | Excess branch transactions (each) | Monthly account keeping fee |
|---|---|---|---|---|
| **ANZ Access Account** | 8 (2 staff-assisted) | 20 cents | $2.50 | $6 |
| **Commonwealth Streamline Account** | 50 cents' worth of free transactions per $500 of savings and loans | 40 cents | $3.00 | None |
| **National FlexiAccount** | $6 worth of free transactions | 20 cents | $3.00 | $4 |
| **Westpac Classic** | 8 (2 staff-assisted) | 25 cents | $2.50 | $5 |

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*Digital TV transmissions begin this month, but few people are likely to take advantage of the new service right away.*

# Digital television: One big yawn?

The media monitoring reports pouring into the Department of Communications, Information Technology and the Arts (DCITA) in late October and early November would not have made happy reading for the department's spin doctors. Just three months out from the introduction of digital television (DTV), Australia's print media savaged the government over problems with the DTV policy — most notably, the fact that almost no DTV equipment was available to consumers, and that the situation was unlikely to change prior to the official startup date of January 1, 2001. Any hopes that the issue might be quietly swept under the carpet were gone.

Announced by IT minister Senator Richard Alston in March 1998, the digital television policy has been criticised for bias towards the major television networks. The networks received guarantees that no new TV licences would be granted until 2008 and were essentially given the spectrum for free. Companies that want to use the spectrum for other services (such as Internet-style interactive services) have to pay, and are banned from producing content that mimics existing TV services.

A handful of concessions were made before the legislation finally passed through the Senate in June 2000 (most of them directed towards the services offered by public broadcasters), but they weren't enough to convince Fairfax or Telstra that buying datacasting spectrum was a worthwhile investment. However, with the official rollout still some time away, analysts were prepared to give the government the benefit of the doubt.

Three months out, the papers weren't so charitable. When the three commercial networks announced in October that they would be subsidising the provision of set-top boxes to consumers, but offered virtually no other details, the attack was on again.

The networks had sought expressions of interest to provide up to 40,000 set-top boxes, but there was some doubt as to whether any manufacturer would bid for such a relatively low number, or when the first equipment would become available. Complete digital TV sets are unlikely to be seen in Australia for some time. Markets which have quickly taken up DTV, such as the UK, have predominantly used set-top boxes in the initial stages.



The government had always maintained that having set the basic policy, it would not seek to influence consumers — that role would go to the networks. "Ordinary Australians must be given a compelling reason to buy a new television set or set-top box," Senator Richard Alston said in July. "It offers the potential — if the industry provides the necessary impetus — to ensure that Australia is a nation where everyone is information rich."

However, this rhetoric didn't wash with everyone. "With a convoluted set of restrictions, the government has prohibited virtually all of the appealing possibilities, and seems to have scared off potential investment by big datacasting aspirants such as Fairfax, News Ltd and Telstra," Franco Papandrea, director of the Communication and Media Policy Institute at the University of Canberra, wrote in a column for the *Australian* soon after the policy was announced.

This bought a quick response from Judi Stacks, chairperson of FACTS, the commercial television industry association. "Digital transmission will offer greatly improved reception to many Australians, including thousands who cannot get usable signals at present," she wrote. Stacks also predicted that some of the companies that had said they wouldn't bid for datacasting spectrum would change their tune in 2001.

One factor the government currently has on its side is that the second half of 2000 demonstrated that there's no easy money to be made in online content. With ventures such as KGrind collapsing, the pressure to provide alternative distribution means has lessened slightly. However, considering that datacasting was predicted to play a central role in helping Australians access a wide range of informational services, the pressure is unlikely to disappear completely — especially with an election looming. The possibility that telephone companies might not take part in the upcoming 3G spectrum auctions, which are expected to be a major source of revenue, will also refocus attention on the question of spectrum availability.

The networks are planning to begin basic high-quality transmissions on January 1, but most executives don't believe mass takeup, or a wide range of other interactive services, will commence for at least six months.

*Angus Kidman*

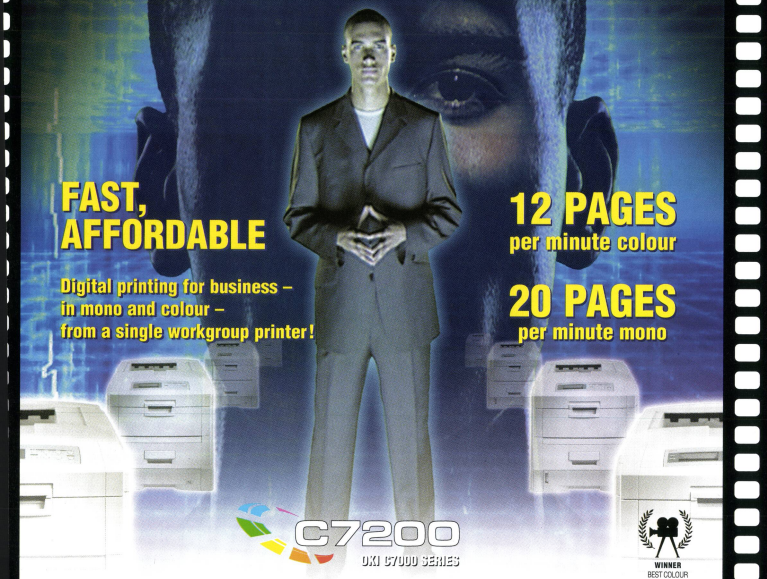
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# Broken promises



*After several delays and lots of bad press, Intel finally released the Pentium 4 in late November. According to Intel, the Pentium 4 offers unparalleled performance and features, but* APC *begs to differ.*

Getting the Pentium 4 to *APC*'s offices and onto the test bench was not easy. Usually one of the first manufacturers to supply machines for testing, Dell procrastinated. Eventually it declined to send *APC* a test system for review, because it knew we would compare it to the AMD Athlon and to a Pentium III system. Dell praised the Pentium 4 system, but asked us not to compare it to others. When a major notebook and PC company refuses a comparative review, there must be trouble.

Eventually, Gateway supplied a Pentium 4 machine as well as the AMD Athlon 1.13GHz system it had already promised. Prior to the launch of the Pentium 4, Intel's benchmarks claimed enormous performance increases. This kind of exaggeration is familiar to *APC* staff from the launch of previous chips. Needless to say, our findings weren't quite as flattering.

| Product | Gateway Performance 1500xl | Dimension XPS-B1000r | Gateway Select 1100 |
|---|---|---|---|
| Contact | Gateway | Dell | Gateway |
| Phone | 1800 500 742 | 1800 292 313 | 1800 500 742 |
| Online | www.gw2k.com.au | www.ap.dell.com.au | www.gw2k.com.au |
| Price | $7,499 | Not available | $4,199 |
| Warranty | 1 year | 1 year | 1 year onsite |
| **Specifications** | | | |
| Processor | 1.5GHz Intel Pentium 4 | 1GHz Intel Pentium III | AMD 1.13GHz Athlon |
| Secondary cache | 256K | 256K | 384K |
| RAM and type (maximum) | 128M RDRAM (512M) | 256M RDRAM (512M) | 128M PC133 SDRAM (128M) |
| Hard disk | 30G Ultra ATA | 30G Ultra ATA/66 | 30G Ultra ATA |
| Hard disk file system | FAT32 | FAT32 | FAT32 |
| Graphics card | nVidia GeForce2 GTS Ultra | nVidia GeForce 256 Plus | nVidia GeForce2 GTS |
| Video bus type | 4x AGP | 4x AGP | 4x AGP |
| Video RAM | 64M SDRAM | 64M | 64M SDRAM |
| Video controller chip | nVidia GeForce2 GTS Ultra | nVidia GeForce | nVidia GeForce2 GTS |
| Monitor | 17in Gateway | 19in Dell | 17in Gateway |
| Tested resolution/colour depth /refresh rate | 1,024 x 768, 16 bit, 85Hz | 1,024 by 768, 16 bit, 85Hz | 1,024 x 768, 16 bit, 75Hz |
| CD/DVD-ROM drive | 12x DVD and CD-RW | 12x DVD-ROM and CD-RW | 12x DVD and CD-RW |
| Soundcard | Creative Labs Sound Blaster Live Value | Creative Labs Sound Blaster Live Value | Creative Labs Sound Blaster Live Value |
| Speakers | Boston Acoustics BA7500 | Altec Lansing ADA885 | Boston Acoustics BA7500 SST |
| Modem | Internal 56K | Conexant Internal V.90 | Internal 56K V.90 |
| OS available | Windows 98, Me, NT, 2000 | Windows 98, NT | Windows Me |
| Software and accessories | Microsoft Works Suite 2000 | N/A | Norton Anti-Virus, DVD Adventure Suite, Microsoft Works Suite |
| **Benchmark results** | | | |
| Business Graphics WinMark 99 | 194 | 354.7 | 502 |
| High-End Graphics WinMark 99 | 6,820 | 1,004 | 1,520 |
| Business Disk WinMark 99 | 547 | 6,240 | 7,573 |
| High-End Disk WinMark 99 | 22,600 | 20,966 | 24,133 |
| CPUmark 99 | 51.8 | 84.5 | 97.5 |
| FPU WinMark 99 | 2,740 | 5,263 | 6,010 |
| Business Winstone 99 | 25.2 | 34.1 | 35.1 |
| 3DMark2000 | 5,994 | 4,806 | 6,866 |
| Quake III Arena 1,024 by 768 at 16 bit | 110.8 | 82.5 | 116 |
| SYSmark2000 | 118 | 195 | 194 |
| Expendable lowest fps | 19 | N/A | 56 |
| Expendable highest fps | 85 | N/A | 132 |
| Expendable average fps | 41.3 | N/A | 89 |
| Video2000 overall | 2,153 | N/A | 2,261 |
| Video2000 quality | 855 | N/A | 822 |
| Video2000 performance | 816 | N/A | 840 |
| Video2000 features | 481 | N/A | 599 |

The product used in these tests is a shipping version available to the public at the time of publication, unless otherwise stated. Winstone, WinBench and associated programs are registered trademarks of Ziff-Davis Inc. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations as to the results.

## Back to the drawing board

By the time the Pentium 4 was launched, Intel had squeezed as much performance out of the Pentium III as was possible. Hoping to put Intel processors in the lead for the next few years, the engineers went back to the drawing board and designed a new chip that works like the Pentium III.

The Pentium 4's new NetBurst microarchitecture includes hyper pipelined technology, a 400MHz system bus, execution trace cache, Internet Streaming SIMD Extensions 2 instructions and rapid execution instructions. The hyper pipelined technology doubles the existing length of the instruction pipeline. While the Pentium III has 10 stages, the Athlon has 11, and the Pentium 4 has 20. Increased stages means instructions are processed faster. The pipeline length has doubled, but the stages are shorter, so each stage is completed faster. In Pentium III processors, if an error occurs at any stage in the pipeline, the entire pipeline has to be flushed. However, the Pentium 4's new execution trace cache overcomes this problem.

The execution trace cache's branch prediction unit predicts, monitors and manages the data as it is executed along the pipeline, and includes caching instructions. Should an error occur, the pipeline must be flushed only as far back as the last caching. According to Intel, this new caching design eliminates about 33% of the errors that occurred in the Pentium III.

The 400MHz system bus is three times faster than the Pentium III's frontside bus (133MHz), but it's not a straightforward increase. The frontside bus is still clocked at 100MHz, but is 'quad pumped' to 400MHz. A fast frontside bus is only useful if you have memory to match. Intel has used the much-maligned Rambus DRAM, which can run at the required 400MHz, but is extremely expensive and requires two or four chips (you can't mix and match capacities). Later this year, there might be Pentium 4 DDR SDRAM chipsets, but only the RDRAM reliant 850 chipset is available now.

The new Internet Streaming SIMD Extensions 2 (SSE2) instructions are a big improvement on the Pentium III's SSE. They have 144 new instructions, including double-precision floating point instructions. The SSE2 is the main selling point for the Pentium 4 for Intel, and it is where the biggest gains for software developers will be seen. However, the new SSE2 technologies won't come into play until the software is written to take advantage of them. This was also the case with the Pentium II's MMX and the Pentium III's SSE.

At the time of writing, the Pentium 4 supposedly needed Microsoft DirectX 8 to work well. When *APC* tested this, the improvement in performance was minimal — so small as to be negligible.

The Pentium 4 die size is 217mm² (over twice the size of the Pentium III die), but only looks slightly larger than a Socket370 Pentium III. The new Pentium 4 socket is a Socket423, which means it has 53 more pins than the Pentium III socket. However, every Pentium 4 system *APC* has looked inside has been dominated by the processor and fans, leaving little room to move. The Pentium 4 is a big chip that draws a lot of power, so it generates a lot of heat and requires more cooling than other processors. This means there is no easy upgrade path to a Pentium 4. If you want to buy this chip, you'll need a new motherboard, a new power supply, new heat sinks, new fans and a new case. This is a lot of expense for what seems to be little gain.

## The benchmarks

Intel is releasing the Pentium 4 at two speeds: 1.4 and 1.5GHz. This is a lot faster than the most recent Pentium III, which runs at 1GHz. A 1.13GHz processor was released in 2000, but was withdrawn from the market due to benchmarking errors. The system submitted to *APC* for review was a 1.5GHz Gateway Performance 1500xl. Despite the huge clock speed increase, the Pentium 4 did not perform as well as the much slower AMD Athlon and Pentium III.

Intel has claimed phenomenal increases in frame rates, (maximums of over 200 frames per second) for Quake III Arena timedemo. This is great for OpenGL games, but it's the minimum frame rate that matters most. If that drops below 25, you're in trouble, because it becomes visible to the naked eye.

The system scored high maximum frame rates in both of *APC*'s gaming tests, but the minimum frame rate for Expendable Timedemo was an unplayable 19fps. Expendable is a DirectX game which should have performed better with the Pentium 4. However, the 1.13GHz Athlon produced better results.

The changes the Pentium 4 incorporates should benefit home gamers but very little was done to the parts of the processor that enable faster business application processing.

*APC* conducted Ziff-Davis Business Winstone 99, the CPUmark 99 and FPU WinMark 99 tests, as well as the SYSmark2000 test. As noted above, the 1.5GHz Pentium 4 performed worse than the 1GHz Pentium III system. The performance deficit was especially shocking considering the significant increase in clock speed, and the theoretical gains possible even from a 1.5GHz Pentium III. Compared to the Pentium III and the 1.13GHz AMD, the Pentium 4 is nothing to write home about. It may be technically one-and-a-half times faster, but it runs a third slower.

Of course, none of these benchmarks are optimised for the Pentium 4, but neither is Windows 2000, Windows Me or, it would seem from *APC*'s testing, DirectX 8.

Pentium 4 systems cost almost twice as much as AMD or Pentium III systems like the ones used in our tests. Intel is planning more Pentium 4 releases throughout the year, so if you're looking to buy a new computer, it might be wise to wait and see what develops.

*Darren Ellis*

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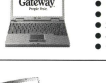
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Gateway™ People Rule.

# Lotus iNotes beta

As a pioneering application in the groupware space, Lotus Notes/Domino has always occupied a key position in the collaborative applications field. However, while the rich programming features and support for advanced replication have always made it popular with administrators and developers, its client has not always been popular with end users. This is particularly the case for users of non-Windows operating systems, or people who require regular Notes access while on the road.

Accessing shared Notes databases within the office is easy, but when you're on the move, accessing Notes can be painful. Usually, you have to rely on the very slow Notes WebMail application, or go through the fun of installing the Notes client on your system of choice.

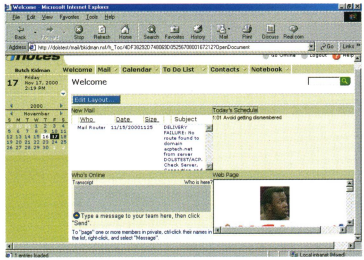
Of course, if you're working on someone else's machine, or from some kind of Web-enabled terminal, client installation may not even be an option. Lotus's latest solution to this dilemma is iNotes, an application it previously codenamed Shimmer.

iNotes gives Notes users access to a much richer interface for Notes mail, and to a group of other PIM-style applications. *APC* examined a beta version of iNotes. At present it only supports Domino servers running on Win32s servers and Win32s clients running Internet Explorer 5. Further down the track, Lotus plans to release server options for other platforms, as well as support for Netscape Navigator 4.7. Lotus is remaining tight lipped about future expansions to cover other operating systems on the client side, but if the technology were expanded cross-OS, an entire Web-based Notes client would be feasible. iNotes is expected to ship sometime in the first quarter of this year.

Setting up a Domino server with iNotes is identical to setting up a regular Domino server, except that Domino Offline Services and iNotes need to be selected. *APC* tested the beta on a fresh server install as there doesn't seem to be an option to integrate with an existing Domino server. This will probably be fixed for release. Having set up our new server and a group of users to interact with it, *APC* started examining the client side.

Previously, Notes WebMail was generated through a mix of HTML and Java applets. To say that Notes WebMail is incredibly slow would be an understatement. iNotes runs through a combination of XML and HTML, and rendering times were considerably faster than under WebMail. There are some minor installs to be done and permissions to be given when first using the iNotes client online.

As PIMs go, iNotes is very capable. By default, the first thing you have to do is set up your preferred Web desktop. Several layouts are possible, and you can choose where you want mail, calendars and even inset Web pages to come up. iNotes is designed to work with Lotus Sametime, but this wasn't functional in the beta we looked at. One minor issue that came up (and may not change by the release) is that iNotes tends to load inset Web pages first. If the page is slow or unavailable this can slow overall rendering considerably.




iNotes is also meant to adjust to local time zones for calendar and appointment functions, but we found that the beta is still easily confused. Several of the appointments we entered vanished into the ether, or caused the calendar to spontaneously jump back a day. iNotes also allows group calendars to be created and worked on by each group member, which is particularly useful for appointment scheduling.

iNotes is very capable and very customisable. You can define desktops for online and offline operation, set calendar layout preferences and save these details both locally and back to the server. There were several functions we couldn't get working properly, such as drag-and-drop attachments and accurate spellchecking, but as this is still at the beta stage, their inclusion alone makes them remarkable.

One of the most impressive features of iNotes is its ability to work offline through the browser. However, this is not without a few problems. When you first attempt to go offline, you need to install the iNotes sync manager software from the Domino server. This takes up more than 24M, so it's not a lot of fun over a slow modem connection, and even worse if you happen to be overseas. It also asks for your userid file, so you need to have that handy. Interestingly, any userid file seemed to work, although using the wrong one causes problems when you try to synchronise back to the server. Hopefully this will be fixed, as it is a security weakness.

Almost any task that can be performed online can be performed offline (except for some group functions, of course). There are plenty of reasons why you wouldn't want to leave a 24M file on someone's machine, but doing so means that users can continue working where network connections aren't possible or have collapsed. It's also a strong incentive to keep user mail files as small as possible, as even replicating a small mail file from a local server is slow. Replicating a 100M plus file over a modem would be a major chore.

*Alex Kidman*

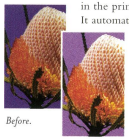
**Pros** Excellent PIM
Future client plans impressive
**Cons** 24M download could be very painful
Inset page loading can be slow

**Contact** Lotus
**Phone** 1800 252 408
**Online** www.lotus.com/iNotes
**Price** TBA

# Full colour, superior economy. $119.[RRP]

## BRILLIANT PHOTO COLOUR on plain paper, super operating economy, high speed blacks, PhotoRealism and automatic image improvement. You can't go wrong with the super value BJC-1000SP.

**Brilliant plain paper photo quality automatically.**
The BJC™-1000SP uses advanced colour definition routines for half-tones and areas of low colour density. A separate, selectable function called Photo Optimiser is included in the printer control software. It automatically adjusts for defects in exposure, highlights and shadows, and prints accordingly with standard inks designed to optimise quality on low-cost plain paper.



*Before.* *After.*

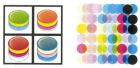



**Reduced operating costs.**
**Using a special resolution matrix, the BJC-1000SP features a Super Economy mode that vastly improves operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.[1]**

**High quality blacks at high speed.**
The optional high capacity black ink cartridge uses 64 print nozzles for high print speeds. The selectable text smoothing mode goes up to 720 dpi to maximise text quality.



*Optional BC-03 high capacity black ink cartridge.*



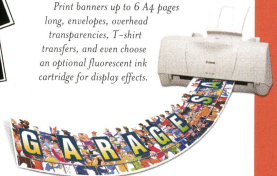
*PhotoRealism produces colours between colours.*

**PhotoRealism.™ When superior photographic reproduction counts.**
The optional PhotoRealism cartridge is ideal for high resolution paper, glossy photo paper and high gloss film. Low-density inks vary colour saturation per dot to dramatically increase the colour combinations, reduce graininess and smooth tonal gradations.



*Better Internet images. Image Optimiser, a printer control software feature, can automatically "correct" low-resolution images up to the printer's maximum resolution.*

*Print banners up to 6 A4 pages long, envelopes, overhead transparencies, T-shirt transfers, and even choose an optional fluorescent ink cartridge for display effects.*



## BJC-1000SP
### Just $119[RRP]

3-YEAR WARRANTY OPTION

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support.*
*For more information call 1800 021 167.*

Canon

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# Gateway Solo 9300xl Deluxe



*APC* has reviewed several versions of the Solo 9300, most recently in September last year (see *APC* September 2000, page 36). Aside from a few minor enhancements, this version of the Solo 9300xl Deluxe is identical to the machine we reviewed six months ago.

That unit contained an Intel Pentium III 750MHz SpeedStep processor, an 18G hard drive, a 6x DVD-ROM drive and 128M of SDRAM. Gateway has re-released the Solo 9300 with an Intel Pentium III 850MHz SpeedStep processor, a 32G hard drive, an 8x DVD-ROM drive and 128M of SDRAM. The chassis, screen and other specifications are the same.

| | |
|---|---|
| **Product** | Gateway Solo 9300xl Deluxe |
| **Contact** | Gateway |
| **Phone** | 1300 302 952 |
| **Online** | www.gateway.com.au |
| **Price** | $7,999 |
| **Warranty** | 1 year parts and labour RTB |
| **Specifications** | |
| **Processor** | Intel Pentium III 850 SpeedStep |
| **Secondary cache** | 256K |
| **RAM and type (maximum)** | 128M SDRAM |
| **Hard disk+A42** | 32G |
| **Hard disk controller** | Intel 82371AB/EB PCI Bus Master IDE Controller |
| **Hard disk file system** | FAT32 |
| **Video controller chip** | Mach64: Rage Mobility C |
| **Video bus type** | AGP |
| **Video RAM** | 8M |
| **Display** | 15.7in SXGA Active Matrix Display (TFT) |
| **Pointer device** | Touchpad |
| **Dimensions (h by w by d)** | 334 by 286 by 42mm |
| **Bare minimum weight** | 4kg |
| **PC Card slot type** | One Type III or two Type II |
| **Port replicator available** | Yes |
| **Docking station available** | Yes |
| **CD/DVD-ROM drive** | TORISAN DVD-ROM DRD-U624 |
| **Soundcard** | ESS MaestroZE PCI AudioDrive (WDM) |
| **Internal modem** | Internal V90 56K |
| **Maximum resolution (internal/external)** | Internal 1024 by 768, external 1600 by 1200 |
| **Battery type** | Lithium Ion |
| **Expansion slots** | IEEE 1394, 2x USB, serial, parallel, external VGA, PS/2, S-Video, video in/out, audio in/out |
| **Carry case included in price** | Yes |
| **OS available** | Windows Me |
| **Software and accessories** | MS Works Suite 2000, MGI Video Wave editing software |
| **Benchmark results** | |
| **CPUmark 99** | 54 |
| **FPU WinMark 99** | 2820 |
| **Business Disk WinMark 99** | 3255 |
| **High-End Disk WinMark 99** | 9560 |
| **Business Graphics WinMark 99** | 106 |
| **High-End Graphics WinMark 99** | 386 |
| **Business Winstone 99** | 28 |
| **SYSmark2000** | 107 |
| **BatteryMark: Battery rundown time (hours:minutes)** | |
| **Max performance** | 4hrs 16mins |
| **Battery optimised performance** | 4hrs 17mins |

The product used in these tests is a shipping version available to the public at the time of publication unless otherwise stated. All specifications details are submitted by the vendor and APC accepts no responsibility for any errors within. Winstone, WinBench and associated products are registered trademarks of the Ziff-Davis Publishing Company. These tests were performed without independent verification by Ziff-Davis and Ziff-Davis makes no representations as to the results. To test the battery we had APM enabled on all notebooks. All power-saving features were disabled.

The processor upgrade is the most significant change in the system configuration, but it doesn't represent a major shift in design strategy. Last November, the Solo 9300 Deluxe was the first notebook to adopt Intel's 750MHz SpeedStep processor and the fastest notebook that *APC* had ever tested. By October, *APC* had reviewed several 750MHz notebooks and most outperformed the Solo 9300 (see *APC* October 2000, page 84). The Solo 9300's CPU upgrade is an attempt to ensure that its performance remains comparable to other notebooks competing in its class.

Curiously, the new 850MHz processor hasn't had much effect. Our benchmark results indicate that the Solo 9300 Deluxe's performance has actually decreased since the last time we tested it. Admittedly, our benchmarking software returned some strange and inconsistent results during the first set of tests we ran. However, when we re-tested the machine, the scores were very similar.

Stranger still, the notebook performed worst in the CPU tests. The Solo 9300's CPUmark99 results were significantly lower than those achieved by the notebooks we tested last October, including the 650MHz Sony VAIO PCGXE7. In that review, every machine with a processor above 700MHz except the Compaq Armada achieved a CPU score of about 67. The 850MHz Solo 9300 Deluxe scored only 54.

However, the rest of the Solo's results helped to redeem the system. It scored well in the Business and High-End Disk tests, achieved a high Business Winstone score, and its graphic performance placed it equal to the middle scores of the October test group. At just over four hours and 17 minutes, the Solo 9300's battery life is still the longest in the group.

Benchmark scores aside, the Solo 9300 Deluxe's features were very impressive. With a 15.7in display, plenty of hard disk space and a comfortable keyboard design, the unit is a viable desktop replacement. Despite the fact that CPU performance appears to have fallen, the IEEE1394 digital video connection, composite video input/output and S-Video connector still make it a good choice to anyone looking for a mobile multimedia workstation.

In November, the Solo 9300 Deluxe cost $7,199. Currently, the unit costs $7,999, but the increase is difficult to justify. Most of it is due to a CPU upgrade that failed to improve the unit's performance. The unit's original price was reasonable considering its overall feature package, so if you have your heart set on owning a Solo 9300 Deluxe, it might be worth buying a Pentium III 750MHz version of the Solo 9300 for $6,499. It offers the same performance as the 850MHz version of the machine.

*Andrew Colley*

| | |
|---|---|
| **Pros** | **Good business performance** |
| | **Long battery life** |
| **Cons** | **Too expensive** |

# 1440 dpi, separate transparent ink tanks with monitoring system. $279.[RRP]

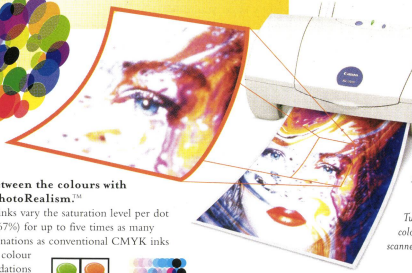
## EXTRAORDINARY QUALITY, superior operating economy, high speed printing plus extra rich blacks, parallel & USB ports for Windows and Mac, optional PhotoRealism and scanner cartridge.

**Advanced imaging performance.**
**Resolution goes up to 1440 x 720 dpi. Drop Modulation Technology™ adds variable ink drop sizes that are automatically used in any of five pattern combinations. Then, the printer control software uses colour definition routines more in line with perceptions of the human eye. The benefits are obvious. Sharply defined lines and text. Vivid, more natural looking colours. Subtlety in shaded and highlighted regions with smooth colour gradations.**



**High speed printing for all colours, blacker blacks.**
Using large print heads and bi-directional printing it prints up to four colour pages per minute. An optional, dedicated black ink tank and cartridge with 160 print nozzles is capable of B&W speeds up to 9 pages per minute.[1] And the black in both the standard and optional cartridge is an extra-rich black ink.



*Automatic Image improvement, broad flexibility, optional scanning. Photo Optimiser adjusts for defects in exposure, highlights and shadows, and prints accordingly. Image Optimiser can print low-resolution Internet images up to the printer's maximum resolution. Print banners up to 6 A4 pages long, envelopes, overhead transparencies and even T-shirt transfers. Turn your printer into a 720 dpi colour scanner with the optional scanner cartridge, pictured right.*



**Colours between the colours with optional PhotoRealism.™**
Low density inks vary the saturation level per dot (e.g. 33% or 67%) for up to five times as many colour combinations as conventional CMYK inks for smoother colour and tonal gradations with vastly reduced grain, even in areas of low colour density.



*PhotoRealism produces colours between colours.*

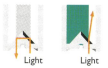
## BJC™-3000
## Just $279[RRP]

*Parallel and USB interface. Both ports are built-in for Windows and Macintosh.[2]*

USB



**Transparent ink tanks, "smart monitoring system," superior operating economy.**
Standard inks are optimised for plain paper. There are individual, transparent ink tanks for all colours, and each is separate from the print head.
A beam of light measures ink status through a prism moulded into the bottom of the tanks. This allows a printer driver monitor to report on ink levels, and alert you when an ink is running low. You replace only one colour at a time, and don't have to worry about running out of ink.




*Smart monitoring system.*

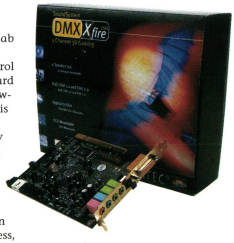
3-YEAR WARRANTY OPTION

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

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# DMX Xfire 1024




Terratec is known for producing high-end soundcards with more features than you can poke a stick at. These cards are usually aimed at digital musicians and sound enthusiasts, and their large number of functions generally put the price well out of the reach of most home users. However, Terratec's new card, the DMX Xfire, is tailored to the needs of the PC gamer, as it supports a range of 3D sound protocols such as Aureal's A3D and Creative's EAX along with the standard DirectSound and DirectSound3D. For old-school gamers, it has full support for DOS mode, so you can go back and play those classics whenever you want.

Four speaker output (two in front and two at the back) gives you surround sound, and the two CD-audio inputs allow for more than one CD drive. The card also has a SPDIF digital-optical out, handy for all those MiniDisc users who have been trying to figure out a way to copy music from their PC without the annoying background static.

Its software bundle consists of Music-Match Jukebox (for MP3 management and creation) and Steinberg WaveLab Lite (for general music editing).

In Windows 95/98, the Xfire's control panel is great for finetuning your card right down to the smallest details. However, the Windows 2000 control panel is not nearly as comprehensive.

In many ways, the Xfire is a slightly scaled-down version of the impressive VideoLogic SonicFury, (see *APC* September 2000, page 50). The core chipsets are very similar; both come from Cirrus Logic's Crystal range. The Xfire provides slightly less power than the SonicFury, but it costs about $75 less, making it more attractive to people who don't need the few extras supported by the SonicFury.

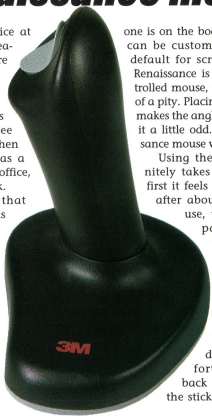
Its two main rivals are Diamond's Monster Sound MX400 (priced at about $170) and Guillemot's Maxi Sound Fortissmo (now retailing for about $100). The Xfire combines the best aspects of these two, but it's not cheap. It costs significantly more than either of them.

***Daniel Gardiner***

**Pros** Great for gaming enthusiasts
**Cons** A little too expensive

**Contact** Innovision
**Phone** (03) 9817 7988
**Online** www.terratec.com
**Price** $199

# 3M Renaissance mouse




We don't often review mice at *APC*, and there's a good reason for this: most mice are similar, and short of actually destroying them, it's hard to tell how robust they are. Still, we're always fascinated by gadgets (see Fetish Gear, page 70), so when a mouse masquerading as a joystick appeared in the office, we decided to give it a look.

Why make a mouse that looks like a joystick? 3M is pitching the Renaissance mouse as more ergonomic than the basic mouse shape. According to 3M, the grip used for a joystick (if properly done) is safer than that used for a standard mouse.

The Renaissance mouse has three buttons. Two of these are on a flip switch at the top of the mouse 'stick' for left and right clicks, and one is on the body of the stick. This can be customised, but is set at default for screen scrolling. The Renaissance is a regular ball-controlled mouse, which is something of a pity. Placing it on a mousepad makes the angle at which you hold it a little odd. An optical Renaissance mouse would rock.

Using the Renaissance definitely takes some practice. At first it feels totally wrong, and after about half an hour of use, we found it rather painful. However, this might say more about bad postural habits than anything else. After another hour's work it felt quite natural, and by the end of the day it was very comfortable. One drawback is that the base of the stick is quite wide compared to a regular mouse, and if you have a smallish mousepad it can slip off quite easily.

The Renaissance comes in two sizes, depending on your hand size. *APC* looked at the small/medium one and found that it fitted most hands. It's only available in a right-handed model at this point, which is a pity for left-handers, as well as for those right-handed people who prefer to use their mouse left-handed due to overuse injury in their right arms.

***Alex Kidman***

**Pros** Ergonomic shape
Long term benefits
**Cons** Right-handed only
Would be better as an optical mouse

**Contact** 3M
**Phone** 13 61 36
**Online** www.3com.com/ergonomics
**Price** $89

# Big printer performance.

## Small printer price & economy. $159.RRP

**HIGH RESOLUTION COLOUR, high-speed blacks and superior operating economy with easy to use, broad flexibility for Windows and Mac. Plus optional PhotoRealism and scanner cartridge.**



**Exceptional results, easily.**
The inks are optimised for plain paper with resolutions up to 720 x 360 dpi that can be automatically enhanced with Drop Modulation Technology.™ Variable drop sizes are placed in any of five "strike pattern" combinations to smooth colour gradations and improve tonal quality.



**Better Internet images, special effects.**
Image Optimiser can automatically "correct" low-resolution Internet images up to the printer's maximum resolution. Turn photos into simulated illustrations and create sepia and mono hues, print banners up to 6 A4 pages long, envelopes, overheads and even T-shirt transfers.





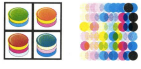
**Duplexing, high speed blacks. A new driver allows manual duplex on plain paper with standard inks.**
For B&W only, an optional dedicated black ink cartridge with 128 print nozzles offers print speeds up to 5 pages per minute.[3]



**Built-in parallel and USB interfaces for Windows and Mac.**[4]



**Drop Modulation Technology.**
Smaller ink drops, about ½ the size, are automatically mixed with standard drops to enhance quality.



*Layering variable ink densities in each pixel lets you print colours between colours.*

**5 times the photographic colour combinations.**
Optional PhotoRealism™ inks vary the saturation so that a single dot could have 0%, 33%, 67% or 100% of a colour. This produces up to five times as many colour combinations as conventional CMYK inks for better half-tones and less grain.



**Reduced operating costs.**
Super Economy mode uses a special resolution matrix to improve operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.[1]

**The optional scanner cartridge captures colour photos and text with resolutions up to 360 dpi.**



**Automatic Image Improvement, easily.**
Advanced colour routines help define half-tones and areas of low colour density. Photo Optimiser automatically adjusts for defects in exposure, highlights and shadows and prints accordingly.





**3 YEAR WARRANTY OPTION**

**Canon Customer Care.**
The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

**BJC™-2100SP**
**Just $159RRP**

**Canon**

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CS106

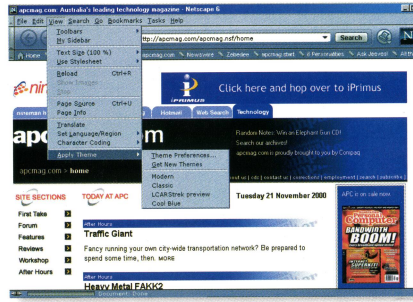
# Netscape 6

Internet Explorer (IE) now dominates the browser market, and many think the browser wars are over. One of the worst PR blunders Netscape made in this war was releasing its preview beta of Netscape 6. It was slow, it was buggy, and to many, it didn't compare well to IE 5's feature set. This was especially true of nontechnical users who didn't understand what Netscape was trying to do through the Mozilla project.

Netscape's PR blitz suggested that the prerelease would be every bit as good as the final version. *APC* examined the preview release of Netscape 6 in our June 2000 issue (page 30), and although we admired the work of the Mozilla team, it was clear there were still significant bugs to be ironed out. The final version is now available for download. Has anything changed?

It's fortunate for Netscape that things *have* changed. One of the complaints about the prerelease was that the supplied theme looked really bad. The final release still uses the same basic theme, but it has been refined and the overall visual effect is much more pleasant. If you really don't like it, the previous Netscape interface is also available in the standard download. Extra themes can be downloaded, but at the time of testing the main Netscape server in the US was totally overloaded. Mozilla themes may work, depending on which Mozilla builds they support — we downloaded several from x.themes.org. Some work wonderfully, and some look like the creators were on a substance not readily available to the public. It's all about personal preference, but many people probably won't want to change anything onscreen.

Netscape is clearly taking lessons from Microsoft. Netscape 6 renders pages much more quickly and doesn't have the same page rendering issues (especially for tables and frames) that bugged previous releases. This puts it in the same class as Internet Explorer 5. However, some lessons clearly didn't need to be learnt, such as the new 'promote everything' philosophy. In this version of Netscape, numerous related icons such as AOL, RealPlayer Take 5 and Net2Phone have been dumped onto the desktop. Cross branding doesn't stop there; Net2Phone and the Netcenter portal have been dumped into the personal toolbar folder and appear ahead of user links. Most of the links operate through the Netcenter portal or other Netscape/AOL businesses. It seems that Netscape is envisaging a rush in advertising and click-through referral profits.




The other lesson that seems to have been taken from Internet Explorer 5 is the assumption that people will put up with huge downloads, even for browsers. Having selected a full installation through the small installation stub, *APC* had to wait for a further 40M of components to download, which was very frustrating. Oddly enough for a Windows program, no reboot was required after installation — now that's the kind of progress we like to see.

As already mentioned, page rendering is quite fast. However, the progress bar is quite hard to find and often doesn't give a true indication of whether a page has finished loading or not. Netscape still uses a lot of memory. For each page *APC* loaded, about 1M of memory seemed to disappear from the system — and some of it has yet to reappear.

It's disappointing to find that Netscape 6 has dropped one of its useful features: the presentation of previously entered URLs when you press Ctrl-l. This means that if you type in an address, get one character wrong and try again, you'll have to type the URL in all over again. It's not a vital function, but is hard to do without.

Mozilla has supported a translation function for some time now, and this has made its way into Netscape 6. However, at the time of testing, *APC* was unable to get it working. We suspect this has more to do with the relevant Netscape servers being overloaded (we tested in the week following Netscape 6's release) than with any fault in the feature.

When *APC* reviewed the Netscape 6 beta last June, we criticised the shonky Java support. Sun's Java runtime environment is again downloaded as part of the install, but there are still a lot of applets that don't work with it. Likewise, at the time of writing, many popular plug-ins (such as Shockwave) would not work with Netscape 6.

All of this might sound disappointing, but it's worth remembering that Netscape 6 is more like a specific build of Mozilla than the end of the line, so there's a lot of potential for improvement. Despite appearances, the browser wars aren't over yet, but in its current form, Netscape 6 is unlikely to challenge Internet Explorer 5's dominance.

*Alex Kidman*

**Pros** Much faster rendering
Better looking interfaces

**Cons** Memory hog
Poor initial plug-in support
Ads, ads and more ads

**Contact** Netscape
**Online** www.netscape.com
**Phone** N/A
**Price** Free

# Super fast dual print heads,

## 1440 dpi, 6 ink colours. $399.[RRP]

### ULTRA HIGH SPEED, superior operating economy, whisper quiet and brilliant quality. Plus optional 6-colour PhotoRealism.

**Advanced print head system.**
The compact body utilises a dual print head system designed to satisfy the needs of even the most demanding user. Speed, plain paper quality, extra rich blacks, individually replaceable transparent ink tanks plus optional 6 colour PhotoRealism and high definition colour scanning. The BJC™-6200 offers it all, in one of the quietest printers ever.




**A smart ink monitoring system alerts users when a colour is running low. There are individual transparent ink tanks for all colours and each is separate from the print heads, significantly reducing operating costs and allowing you to replace only the empty tank.**

**1440**
**dpi plus Drop Modulation Technology**

*An optional scanner cartridge delivers resolutions up to 720 dpi.*



**Superior plain paper print quality.**
Standard inks are optimised for plain paper. Resolutions go up to 1440 x 720 dpi. Drop Modulation Technology™ automatically adds variable ink drop sizes and the printer control software defines colour more in line with perceptions of the human eye.

**BJC-6200**
**Just $399[RRP]**

USB

*Built-in parallel and USB interfaces for Windows and Mac®.*



**Higher speed, blacker black.**
A high performance engine with bi-directional printing capable of up to 3 lines per pass results in monochrome text speeds up to 10 pages per minute and colour printing up to 7 pages per minute, making the BJC-6200 easily the fastest printer in its class.[1] Plus the black cartridge employs pigment inks for a richer print density with greater water resistance.

| 7 | 10 |
|---|---|
| ppm colour | ppm mono |

**PhotoRealism™ with 6 ink colours for even more tonal gradation.**
Optional low density PhotoRealism inks may be used simultaneously with standard density colour inks. The 6-colour system delivers life-like reproduction, especially on higher paper grades. Tonal gradations are smooth even in difficult to reproduce colours such as skin tones and light, glossy surfaces.



1 YEAR WARRANTY OPTION

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

Canon

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CS9808/4

# Dragon NaturallySpeaking 5 Preferred




When *APC* last reviewed voice recognition software (see *APC* May 2000, page 118) the recognition rates for Dragon NaturallySpeaking had improved a great deal, especially considering the software had added recognition patterns for Australian accents.

Since that review, Dragon Systems was bought out by competitor Lernout & Hauspie. The new Dragon division looks after conventional voice recognition and the main company focuses on integrated voice recognition for products and peripherals. This is the first update for the NaturallySpeaking product line since that merger, and *APC* was keen to find out what changes had been made.

The biggest change from the previous version of Dragon NaturallySpeaking is that direct integration into major programs has been replaced with the DragonBar. This is a separate program that resides over, beside or under any program you dictate NaturallySpeaking into. Keeping things separate is a good move, and having the bar on top makes it easier to configure and use the software. Alternatively, you can set the DragonBar as a system tray icon.

The more you train the system to recognise your voice, the better it becomes at picking up the words being spoken. After the compulsory training for our review, the software picked out individual words spoken at a normal pace, but the rate of error was unacceptably high. After training it a little more by using one of the extended training sets, we were able to dictate into Microsoft Word 2000 with few problems. The improved recognition rate could have been the result of a different microphone headset, or because of the extended training.

Other improvements and additions include a more detailed and advanced help section with online tutorials, the ability to save audio dictation so that it can be double-checked later, and support for Lotus Notes.

NaturallySpeaking 5 was tested on a Pentium II system with 96M of SDRAM, but when run on a Pentium III it was much faster and more accurate. This is a worthwhile upgrade for those already using NaturallySpeaking, or a good entry point into voice recognition for the uninitiated.

*Darren Ellis*

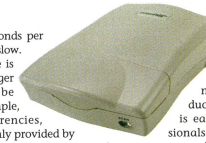
**Pros** Recognition rates have improved
**Cons** Not quite hands free

**Contact** Marketing Results
**Phone** (02) 9899 5888
**Online** www.dragonsys.com
**Price** $399.95

# Prime Film 1800u

Personal scanners are becoming more affordable, so it was only a matter of time before personal slide scanners also entered the market. Scanning a slide often produces better results than scanning photographs because the light passes through the image, giving brighter colours and contrasts. If you already own a flatbed scanner and want a cheap slide scanner, the Prime Film 1800u is a good option for home users.

The Prime Film connects through USB and is Mac and PC compatible. It comes with basic image-editing software as well as applications which allow you to create photo albums, slideshows, calendars and greeting cards. You can easily scan 35mm slides and negatives by placing them into the tray using the bundled scanning software, which produced surprisingly professional results. It has full resolution, colour and size adjustment. The quality of the scans is also good — the 36 bit per pixel for colour and 12 bit per pixel for greyscale enables up to 68 billion colours. However, at an average 35 seconds per scan, it was rather slow.



Professional use is limited because larger formats cannot be scanned. For example, medium transparencies, which are commonly provided by photographers when scanning images for publishing, simply won't fit the unit. If this could be a problem for you, you're better off investing in a good flatbed scanner with slide-scanning capabilities. Most of these work in a similar way to a flatbed, with the slide scanner reading from inside the lid. This enables you to scan slides as you would any other image. It also allows you to scan more than one image at a time, which is very useful as the dreaded deadline approaches.

The other included software is not of great use to professionals. Stick to Adobe Photoshop, CorelDRAW or other professional image-editing packages.

If you want to scan 35mm slides or negatives for home use, the Prime Film 1800u is definitely a good option as it produces professional results and it is easy to use. However, professionals might want to invest in a scanner that accommodates medium-format transparencies.

*Craig Carroll*

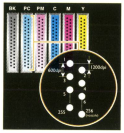
**Pros** Affordable
Easy to use
High quality results
**Cons** Cannot scan all formats

**Contact** Innovision
**Phone** (03) 9817 7988
**Online** www.scanace.com
**Price** $449

# Microfine droplets, 1200 x 1200dpi. Just $699.RRP

**ONE MILLION four hundred and forty thousand drops per square inch, 6 ink colours, 4 pico-litre sized drops and 33 tonal levels. Photo printing with zero-graininess image quality beyond the limits of human eye-sight.**

**Smaller, better ink droplets. A unique Canon process called MicroFine Droplet Technology™ produces 4 pico-litre ink drops. Using a special star shaped nozzle each droplet is created to be centre-weighted and near perfectly round for more accurate placement.**




*Nozzle layout diagram.*

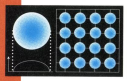
**Extra large print heads with 6 transparent ink tanks.** There are 256 print nozzles per colour for a total of 1,536 on the print head. This helps resolve the conflict between speed and quality. Separately replaceable, transparent ink tanks and a smart monitoring system help maximise operating economy.



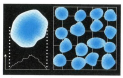


*Star shaped nozzle.*

*High precision dot control.*



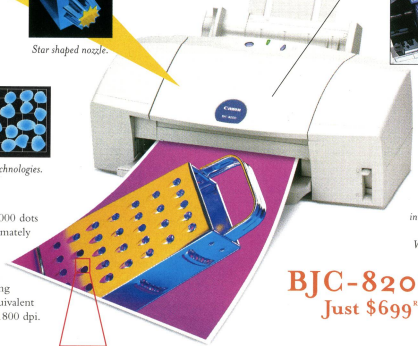
*BJC-8200.*



*Lower-level technologies.*



*An optional scanner cartridge delivers resolutions up to 600 dpi.*



**1200 x 1200 dpi, super low density ink.**
Precision placement allows 1,440,000 dots per square inch using inks approximately ¼ the density of normal inks. This gives an apparent dot size corresponding to 0.67pl of regular ink, enabling photo printing equivalent to approximately 1800 dpi.

*Parallel and USB interface. Both ports are built-in for Windows and Mac.*

**BJC-8200**
**Just $699**RRP

**SuperPhoto mode, 33 tonal levels.**
In SuperPhoto mode the BJC™-8200 can print up to 42 ink droplets per pixel (dot). This allows the printer to achieve 33 tonal levels with zero graininess, even in highlights or gradations where dots are normally distinguishable.



*SuperPhoto mode with 33 tonal levels.*

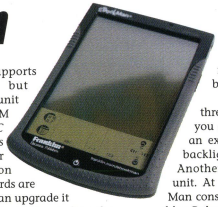
*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

1-YEAR WARRANTY OPTION

Canon

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C30808/5

# Franklin eBookMan



When is a PalmPilot not a PalmPilot? When it's a Franklin eBookMan. First impressions are misleading, as this unit has almost the same interface and styling as a regular Palm device. However, the eBookMan has a larger screen than most Palm units, which is important as its main role is storing and presenting ebooks.

*APC* looked at a preproduction eBookMan unit. We weren't able to test the connectivity of the unit as no synchronisation software was available at the time of writing. *APC* was rather concerned by the manual, which seems to indicate that no CD will be included with the eBookMan: all software has to be downloaded. This won't be a selling point for people with dodgy 56K connections.

The cradle is interesting as it connects to the PC and the eBookMan by USB. Why a cable isn't used is unclear. The capacity to synchronise with Outlook databases is also promised with the finished unit, but could not be tested.

As a PDA, the eBookMan is adequate, but unexciting. There are the usual to-do list, notepad, calendar and address book options. It also supports MP3 playback, but because the basic unit only has 8M or 16M (8M in the unit *APC* looked at), there's not a lot of room for your Sheena Easton rips. Multimedia cards are supported, so you can upgrade it to 64M if you don't mind spending the money. Of course, without any synchronisation software, we could only listen to the stock music. It wasn't unpleasant, but the built-in speaker is a little tinny, so you'd be better off with headphones.

Where the eBookMan does show some promise is in book reading. You can download the usual text files, as well as audio books through audible.com. The reader software uses Microsoft Reader, so any compatible books should be 'readable'. The screen is large and clear, but the controls on the unit *APC* looked at beeped continually, no matter what we did. This might be a preproduction bug. The unit nearly went out the window when this reviewer was threatened by frustrated workmates.

The eBookMan comes at three price levels. For $299, you get a basic 8M unit. Add an extra $100 and you get a backlight and MP3 playback. Another $100 gets you a 16M unit. At those prices, the eBookMan constitutes a challenge to the older Palm market, but it doesn't seem to have the programmable flexibility of most Palms. Without the software, it's hard to effectively evaluate this unit.

*Alex Kidman*

**Pros** Big screen good for reading books
**Cons** Almost the same price as a Palm
Beeping, beeping, beeping

**Contact** Franklin
**Phone** 9757 1999
**Online** www.franklin.com
**Price** $399

# Canon PowerShot




This is a very serious camera. For just over $2,000 you get semiprofessional SLR (single lens reflex) capability with all the usual digital advantages: exposure; shutter speed and focus options; variable ISO speed settings; white balance and external flash support; as well as the usual timer, zoom and macro. The unit has a compact body housing, a 34 to 102mm equivalent f:2.0 lens and coupled optical viewfinder. It is extremely solid and is heavier than most of its 3.3 megapixel competitors — presumably due to its cast metal construction.

The G1's power comes from a hefty 1,100mAh lithium ion camcorder-style battery. Storage is provided by a 16M CompactFlash card in a Type II slot. The top panel is the control centre of the G1; it has a multistatus LCD, an SLR-type program wheel and a shutter button/zoom control. The program wheel has a three-mode (record, play, host connect) power switch and a staggering 12-mode program selector. Settings include manual control, aperture priority, shutter priority, program, full auto, quick shot, portrait, vista, night shot, mono, panorama and movie. Using the first four modes allows full control over aperture, depth of field, flash type, focus, exposure metering and white balance. This is superb image control. The lens can accommodate screw-in wide and tele convertors, and the rotating flip-out LCD screen on the back panel allows image verification. The back panel has more buttons for flash, macro, menu and select, plus a four-way rocker control for menu navigation. A dioptre control is also included. The G1 is relatively slow to power up (six seconds), but shooting is much faster, at about two seconds between images at normal resolution (1,024 by 768 pixels) and just 2.5 seconds at maximum resolution (2,048 by 1,056). That's pretty good.

Using the crisp LCD screen, you can adjust the controls to preview the image for focus, blur, aperture and so on. However, we did manage to fool the flash in auto mode on some close-ups. The camera can also shoot Motion JPEG and plays it back full screen using the built-in microphone and speaker, or it can download using the built-in USB link. A remote control is also supplied.

Results from the G1 can only be described as superb. For weddings and most publishing work, this camera is more than capable. At best resolution and largest size, zooming in up to five times yielded no jaggies and excellent colour balance — very impressive indeed. This camera is terrific value for casual snappers and semiprofessionals.

*Jeremy Torr*

**Pros** Extremely versatile
Easy controls
**Cons** Heavy
Paltry 16M memory card

**Contact** Canon
**Phone** 02 9805 2000
**Online** www.canon.com
**Price** $2,199

# Portable, cordless, small and smaller. From $399 RRP

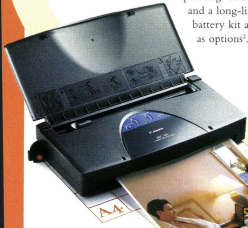
## WONDERFUL IDEAS FROM CANON for people needing a portable printer. Choices in size, weight and performance enhancement.

**BJC™-85. Super powerful portable printer, international adaptor standard.**
It fits easily into a briefcase, but offers desktop quality and flexibility. An international power adaptor is standard and a sheet feeder is built-in. IrDA 1.1 plus parallel and USB interfaces for printing from Windows, Windows CE and Mac are standard. Gold standard photographic printing via PhotoRealism™ and a long-life NiMH battery kit are available as options[2].

*Totally cordless operation. Battery packs[1] and built-in infrared (IrDA) interface work with suitably equipped notebooks or PC's to print without needing interface or power cables.*



**BJC™-50. Ultra small, ultra light, built-in Li-ion battery.**
Weighing only 900 grams, the BJC-50 is approximately ½ the size and weight of the BJC-85. Using the included battery and IrDA interface it is capable of cordless communications out of the box, and offers a host of performance enhancements similar to the BJC-85.[2]





## BJC-50
Just $649 RRP

**Exceptional colour reproduction, automatically.**
Using standard inks optimised for plain paper, both printers automatically print high quality images using special functions included in the printer control software. Drop Modulation Technology™ uses variable ink drop sizes to smooth colour and tonal gradations.

## BJC-85
Just $399 RRP



**High quality colour, high speed black and white.**
A four colour print head with resolution up to 720 x 360 dpi comes as standard. Both printers accept an optional dedicated black ink cartridge with 128 print nozzles for print speeds up to 5 ppm.[2]



Photo Optimiser adjusts for defects in exposure, highlights and shadows and prints accordingly.



*Variable ink-drop sizes.*

*Optional colour scanner cartridge for images, fax and OCR.*[4]



Image Optimiser can "correct" low-resolution Internet images up to the printer's maximum resolution. You can print banners up to 6 A4 pages long, envelopes and overhead transparencies.

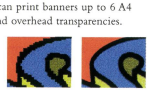


*High speed black.*



*Four-colour print head.*





*Canon Customer Care.*
*The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

3-YEAR WARRANTY OPTION

Canon

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# Netting a bargain

## Call waiting

I enjoyed Alex Kidman's article on Net telephony (see *APC* November 2000, page 102), and would like to tell you about my experience with Net2Phone.

I have been using it for over two years and it has saved me literally thousands of dollars. I was doing consultancy work in the Marshall Islands and running projects back here in Brisbane and elsewhere in Australia. I also have family in Canada and the UK. During 18 months over the two year period, I used Net2Phone with my IBM ThinkPad 380D (until it died) and afterwards with my new, super-duper IBM ThinkPad I 1700.

Telephone calls from the Marshall Islands are ridiculously expensive — about $3.50 per minute to Australia, after a flagfall of $5! With Net2Phone, it's about 15 cents a minute. I was often on the phone for two or three hours at a time. You can imagine the savings. I still use Net2Phone, because I put $US50 on the account and it is taking a long time to use it up, despite calling Canada and the UK frequently.

I had a little trouble getting Net2Phone to accept my Australian credit card, but that's a common problem with the US. Once it was accepted, recharging my account was simple.

I have a digital video camera now, so I want to get into video telephony — it never ends!

*Euan Lindsay-Smith*
*West End, Qld*

## Game consolation

I couldn't agree more with Sebastian Chan's comments in 'Game brain drain' (see *APC* October 2000, page 56). For several years, I have countered my son's pleas for a Nintendo 64 or PlayStation with the argument that a PC is a much more flexible and cost-effective alternative to a games console. However, while the flexibility is still there, the cost effectiveness has gradually been eroded over time to the point where I'd need to buy a PCI 3D accelerator, or more realistically an entire new system, if I wanted to play the latest games.

As Chan said, the focus seems to be more on getting better graphics for the same old games than on coming up with something more interesting that will run on most PCs. The hardware requirements for Star Wars Phantom Menace from LucasArts must have only been met by about 1% of the world's PC population. Thankfully, 3DO's range of Army Men games works on the majority of PCs.

I have since conceded to my son's wishes, and he is now happily engrossed in playing Zelda and Banjo Kazooie on his Nintendo 64. At least I can be sure that the Nintendo games will always work without me having to worry about installing them, hardware or software conflicts, endless incremental driver/DLL upgrades, running out of hard disk space, catching a virus, or having to fork out $500 for the latest 3D graphics card.

PC developers should take a hard look at consoles to grasp the true meaning of 'plug and play'. Until PC games developers get their act together and start developing to a set of standard specifications, it's just too painful to play the latest PC games. Long live the console! (And bring back Paradroid!)

*David Duncan*
*Canning Vale, WA*

## Award

I read with horror that Optus@Home has won the Breakthrough Award from *APC*. How can *APC* justify this choice?

Optus@Home has done nothing but bully and intimidate its customers into accepting a download cap or face disconnection. This smacks of a total lack of concern for the customer. Optus clearly advertised unlimited downloads, but when people took advantage of this they were suspended or disconnected. "The Breakthrough Award recognises changes that have a significant impact on the way we use technology," said *APC* editor-in-chief Angus Kidman.

Does Optus have the right to retrospectively apply a limit on downloads when people signed up in good faith and paid exorbitant costs for unlimited downloads?

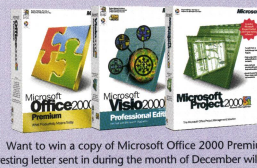
This is like giving the award to the designers of the Titanic for saving money on materials (who needs watertight compartments?). Now Optus is saying that although they said prices will get cheaper when the Southern Cross cable is open, this may not happen.

If this is the best that *APC* can come up with for the Breakthrough Award 2000, then shame on you *APC*.

*Name withheld*
*Internet*

*APC considered Optus@Home worthy of the Breakthrough Award, but also included it in 'Dogs of 2000' (see page 68). See what you think of APC's other award selections on page 62.*

## Letter of the month




Want to win a copy of Microsoft Office 2000 Premium?

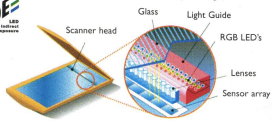
The most interesting letter sent in during the month of December will win its writer a free copy of the world's most popular personal productivity tools, including copies of Microsoft Office 2000, Visio 2000 Professional and Project 2000. The total value of these packages is $3,102. The winner of this fantastic prize will be published in *APC* March. This month's winner is David Duncan.

# It's not *just* a scanner, it's a Canon for only $119.[RRP]

## SLEEK, SIMPLE TO USE scanners with patented LIDE Technology, pass-through parallel connection and full software suite.

**Introducing LIDE.**™

LIDE (LED Indirect Exposure) fundamentally changes the way scanners work, and their price/performance ratio. LIDE eliminates the need for costly, complex optical mirrors, while it maintains image quality and colour clarity in two super slim, sleek scanners. The CanoScan N340P (300 x 600 optical dpi) and CanoScan N640P (600 x 1200 optical dpi).







**Easy to use.**
**The ScanGear Toolbox (pictured above) lets you select functions and the final destination of your scan such as printer, e-mail program, fax, copy or others, and automatically makes settings for you.**

300 x 600 dpi

## CanoScan N 340P

Just $119[RRP]

**Getting started is remarkably easy.**
Your scanner plugs directly into the parallel port, or hooks up as the middle link between a printer and your PC. Quick-and-easy CanoScan™ Setup installs the included software, and you're ready to make your first scan with Windows 95/98/2000/NT 4.0.




*LIDE technology allows a smaller, sleeker design.*

**Full software suite, 42-bit colour input.**
The CanoCraft CS-P software works for both stand-alone image acquisition, and as a TWAIN driver for other applications. Advanced controls for colour matching and image definition allows various pre-scan settings such as selecting the scan area and adjusting resolution up to 9600 dpi[2] with up to 42-bit colour input. The software package also includes ArcSoft PhotoStudio 2000 for photo-editing and Caere OmniPage Pro for converting scanned documents into editable text data, plus a CD ROM with user's manual.



*CanoCraft makes high quality colour easy.*

42
bit input

600 x 1200 dpi

## CanoScan N 640P

Just $149[RRP]

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

3-YEAR WARRANTY OPTION

Canon

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*Open hardware and controlled software worked well for PCs, but the future may lie in a different direction.*

# Licence revoked



**Angus Kidman**

Angus Kidman is editor-in-chief of *APC* and **Newswire**. He can be contacted at akidman@acptech.net.

At first glance, coming up with a great design for a product and then licensing it to other manufacturers so they can produce compatible models might seem like a really good idea. After all, that's essentially how Microsoft rose to its present world-shagging position of dominance. It made its operating system (MS-DOS and later Windows) available to pretty much anyone willing to sign a licensing deal. From this rose the modern PC industry (and numerous allegations of lying, cheating and anticompetitive practice that we don't have time to go into here).

Considering Microsoft's huge success, it's no surprise that other companies are following a similar path. Palm is eagerly telling analysts that its future lies in licensing the Palm OS to other manufacturers — huge revenues for its handhelds notwithstanding. Sega wants to de-emphasise its role in console manufacturing and license its hardware design to third parties. Even the phoenix-like Amiga plans to create a new OS and a reference hardware design that will be built by external assemblers.

Despite the precedent set by Microsoft, I can't help thinking that most of these plans are doomed to failure. Making a licensing deal work requires more than just a technically nifty design; you also need timing, a big marketing budget and a hefty dose of luck. It's possible that Palm possesses this combination, but I don't see any of these factors at work for Sega or Amiga.

Also, the world isn't the same place it was when Bill Gates signed a deal with IBM back in 1981. For one thing, the cost relationship between hardware and software has almost reversed. Back when a PC without a hard drive could cost you more than $3,000, it made sense for the OS to be a simple, cheap commodity. However, the fall in hardware prices over the past two decades has been counterbalanced by software that's more complex to develop and manage. It's now likely that, in terms of development hours, the OS is the most expensive part of a PC, not the cheapest.

Finally, and perhaps most importantly, there's the question of stability. The massive overriding disadvantage of the open model adopted by Windows (and also by Linux, albeit in a markedly different form) is that it makes almost impossible to predict exactly what hardware your OS will be running. As a result, stability is still a major problem for PCs of all kinds. Who cares how powerful your system is when all it ever seems to display is the dreaded blue screen of death?

Who cares how powerful your system is when all it ever seems to display is the dreaded blue screen of death?

This is a lesson that console makers learnt early. PlayStation may have only a fraction of the power of a contemporary PC, but you don't need specialist knowledge to operate it. You just switch it on and it works. By choosing to move towards a licensing model, Sega is effectively walking away from this advantage — a potentially dangerous move.

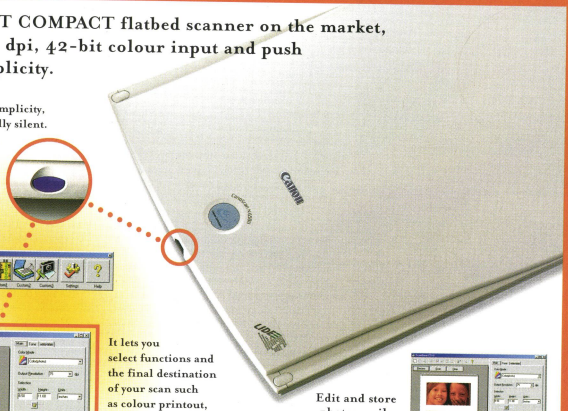
Of course, Apple's experience doesn't support these arguments. It abandoned a brief mid-'90s flirtation with licensing clones and its market share has remained more or less stagnant ever since. However, this doesn't prove that sticking to cloning would have helped Apple.

The one factor that's almost impossible to calculate is luck. Microsoft was lucky to be in the right place at the right time when IBM wanted an OS. Palm was lucky to come up with a viable design for a handheld at the moment when demand for them was set to soar. But luck is a fickle partner, and not something you really want to build into your business plan.

# Plug and play USB, push button simplicity 600 x 1200 dpi, just $189.[RRP]

## THE MOST COMPACT flatbed scanner on the market, 600 x 1200 dpi, 42-bit colour input and push button simplicity.

**Push button simplicity, unconventionally silent. A one touch scan button activates ScanGear Toolbox CS (the scanner control software).**






**It lets you select functions and the final destination of your scan such as colour printout, e-mail program, fax, copy or others,[1] and makes the necessary settings for you.**



**Edit and store photos easily.**
ArcSoft PhotoStudio 2000 is an easy to use image editor, and ArcSoft PhotoBase creates photo databases. Adobe Acrobat Reader and PDF manuals for Windows and Mac are included.

**High powered scanning with LIDE.**
Patented LIDE™ technology delivers optical resolution up to 600 x 1200 dpi with 42-bit colour input. ScanGear CS offers direct scanner control and is a universal TWAIN driver for other applications. It lets you make pre-scan settings such as selecting the scan area and adjusting resolution up to 9600 dpi.[2]



## CanoScan™ N 650U
### Just $189[RRP]

**Plug 'n play USB for Windows and Mac.**
The USB interface is compatible with Windows 98/2000 and Mac OS 8.5 or higher[3]. It lets you plug in or disconnect your scanner without having to turn off your computer first. And, because the scanner is powered directly through the USB cable, it does not need a separate AC cable.



**42 bit input**

**"Z-lid", advanced OCR.**
This special lid simplifies book scanning and OCR with the bundled Caere OmniPage Pro[4] converting scanned text into editable data.

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

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*IT is becoming more about making applications work together than about developing new software.*

# Cooperative coding



**Jeremy Horey**

Jeremy Horey is a senior consultant with Com Tech. The views expressed in this column do not necessarily reflect the views of Com Tech. He can be contacted at jhorey@ozemail.com.au.

Currently, there are probably less than 5 million programmers actively coding in the world. Whatever the number, and whatever their productivity level, that is still a lot of code being produced each year.

Ten years ago, around half of all the programmers working in large organisations were keeping old applications going. They were fixing bugs, adapting the software to fit new conditions or adding new functions.

This has changed dramatically. The Y2K bug is partly responsible, as businesses have replaced old systems with new ones. Most large organisations now depend on applications developed by companies like SAP and Oracle for large parts of IT systems, so many upgrades and bug fixes are done by these companies and then distributed among users.

The adoption of these systems (called ERPs, for enterprise resource planning systems) from companies such as SAP, JD Edwards and Oracle means that organisations now have to do a lot less inhouse software development. At the same time, there are fewer ERP software makers, fewer software tool makers and fewer companies making personal productivity software like word processors and graphics programs. The one area where there has been a huge increase in software development is in ecommerce and the Web.

There's also been a change in how software is developed. Programmers have moved to a component-based model. We are still a long way from the object-oriented dream of having 80% of every program built from reusable components, but all the software tools used in Web development now aim to make reusable components. As a result, programmers don't spend as much time working out clever algorithms and constructing programs. They spend more time finding components and making them work together.

The one area where there has been a huge increase in software development is in ecommerce and the Web.

One of the changes the Internet has forced on businesses is that they must now make their applications work together. Before the advent of the Web, IT systems were separate islands with an occasional bridge to allow data to pass from one to another. Often, human beings spanned at least part of the bridge by re-keying data from one program's printout into another. However, to make commerce on the Internet possible, businesses need to move data smoothly and quickly from one system to another without human intervention.

It's no good having a system that can take orders over the Web if it can't determine whether you have the stock to meet the order and are able to get it straight to dispatch. There are now compelling reasons to get applications to communicate quickly and reliably with each other.

Market research company Gartner Group has suggested that within a few years large companies will be spending more on application integration than on developing new software. Already businesses are attempting to put together application integration architectures. These provide consistent, reliable and expandable ways for applications to exchange data using the same mechanism. Eventually, this sort of infrastructure will be incorporated into operating systems.

Now, we expect to be able to communicate between browsers and Web servers, and between email systems. In the future, we will have the same seamless integration between all our applications.

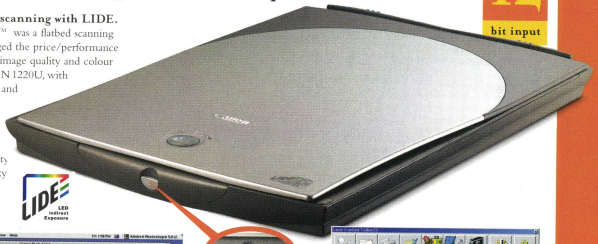
To get to this point, a lot of programmers are going to move away from building software to developing ways for programs to interact. This new approach requires cooperation between software companies over interaction standards. XML is a good start, but over the next few years we will see a much closer kind of interaction.

# *Super high* resolution in a *super sexy* scanner, just $299.[RRP]

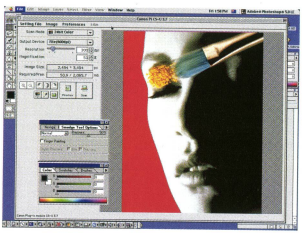
## SCANNER BREAKTHROUGH. 1200 x 2400 dpi, 42-bit colour input and LIDE technology in an ultra compact case.

42 bit input

**Semi-professional scanning with LIDE.**
Canon's patented LIDE™ was a flatbed scanning breakthrough that changed the price/performance ratio while maintaining image quality and colour clarity. The CanoScan™ N 1220U, with 1200 x 2400 optical dpi and 42-bit colour input, demonstrates the evolution of this technology, delivering "semi professional" quality in a super slim, super sexy looking case.



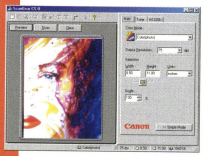
LIDE LED Indirect Exposure





**Simple, professional quality software.**
The one-touch scan button activates ScanGear Toolbox CS to select functions and the destination of your scan such as colour print out, e-mail program, fax, copy or others,[1] and makes the necessary settings for you. ScanGear CS offers direct control for pre-scan settings such as selecting the scan area and adjusting resolution up to 9600dpi.[2]
It is also a universal TWAIN driver for applications such as the bundled Adobe Photoshop LE, a limited edition of the world's most popular image editor.



**Edit and store photos easily.**
ArcSoft PhotoBase creates electronic photo albums. Arc Soft PhotoStudio allows easy image editing.

## CanoScan N 1220U
### Just $299[RRP]



**"Z-lid", advanced OCR.**
This special lid simplifies book scanning for OCR with bundled Caere OmniPage Pro[4] to convert scanned text into editable data.

**Plug 'n play USB for Windows and Mac.**
The USB interface lets you plug in or disconnect your scanner at any time without having to turn off your computer first.[3] And, because it is powered through the USB cable, the scanner does not require an AC cable.

USB

3-YEAR WARRANTY OPTION

*Canon Customer Care.*
*The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

Canon

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CS980809

*Why is Australia merely stumbling its way into the 'new economy'?*

# Ten things I hate about .au



**Kimberley Heitman**

Kimberley Heitman is a Perth lawyer and chairperson of Electronic Frontiers Australia. He can be contacted at kheitman@it.net.au.

Australia's readiness for the 'new economy' is under increasing scrutiny. 10 factors must be addressed before the country can expect to succeed.

**1. Ecommerce** Dubai has just announced plans for an 'Internet city' — no tax, cheap leases, little regulation and other incentives for companies to relocate to the desert. Australia isn't going to earn much in taxes if all the ecommerce is conducted overseas, so it's time to look seriously at the economic benefits of offering foreign companies more than online GST registration.

**2. Digital identity** Despite registering births, deaths and marriages, the government doesn't provide proof of identity for the online environment. I'm not suggesting we be forced to have an internal passport, but if the government and banks intend to encourage transactions online, the onus is on them to ensure that online identity is verifiable.

**3. Privacy** The Privacy Bill proposed by the Federal Government would legalise privacy abuses. To get serious about online privacy, a Privacy Commissioner with audit, investigation and prosecution powers should be set up, and the gaping loopholes in the present bill must be removed.

**4. Education** Kids in school huddle around scarce computers and wait patiently while the lessons of the Internet trickle through inadequate bandwidth and useless software filters. They're the lucky ones. Almost no-one over 30 who isn't in a well-wired business has had any sort of Internet training.

**5. The digital divide** Half the population is online. Some of the rest will never get online without help. It's a multifaceted problem, due partly to the cost of hardware, partly to the cost of Internet access and partly to a lack of basic computer skills. Public Net access in libraries, councils and community organisations will help, so will re-tooling (as opposed to recycling) obsolete computer equipment from government and industry.

**6. Government services** More than a third of Federal Government agencies won't confirm whether they'll meet the promised 2001 deadline for delivery of all "appropriate" Government services online. A quarter of agencies didn't even hand in their reports, and of the rest, 18% couldn't commit to having a usable Web site online.

**7. Content regulation** The government needs to realise that the Internet is not a TV, it is a truck. With upwards of 2 billion Web pages, gigabytes of Usenet daily, huge traffic in chatrooms, ICQ and IRC, Internet content defies regulation. The best defender of community standards is an online community.

The best defender of community standards is an online community.

**8. Broadband** At this rate, it will be years before the ACCC can force Telstra to provide cheap broadband. We need widespread availability of fast Internet access. If we master broadband content services early, that will give us an advantage on the world stage.

**9. Viruses** Computer users must work with operating systems and applications that are not secure against viruses, let alone deliberate intrusion. Protection should be on every training agenda, and government campaigns as vehement as antismoking warnings wouldn't be out of place.

**10. Spam** The ACCC allows electronic marketers to send unsolicited commercial email, provided that there is an 'opt-out' option available. On behalf of disgruntled users, many ISPs submit the offenders and their ISP's details to international blocklists, such as the Mail Abuse Prevention System. Only 'opt-in' mass commercial postings using email addresses from existing customers or verified subscribers should be considered acceptable. At present, Australian law is a spammer's delight.

# Combined print *and* film scanner with USB, *surprisingly low* $299.[RRP]

## BUILT-IN FILM SCANNING up to 1200 x 1200 dpi plus high quality photo scanning in an easy to use scanner.



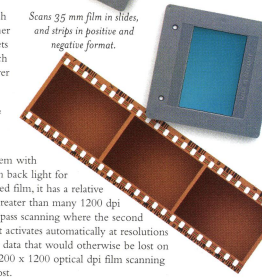
**Easy to use print and film scanner with USB.**
The CanoScan™ D660U solves diverse scanning needs simply. No adapters or add-on kits. Everything is built-in, and is available with the push of a button, one for photos, and one for 35 mm positive or negative film in either slide or roll format. For beginner controls, ScanGear Toolbox lets you select functions and the final destination of your scan such as printer, e-mail program, fax, copy or others.[1] Or, direct driver control lets you adjust scan size, resolution, and other parameters. The USB interface connects to either Windows 98/2000 or Mac OS systems.[2]




USB

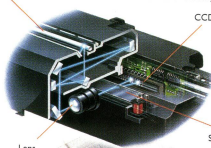


*Scans 35 mm film in slides, and strips in positive and negative format.*



VAROS

**Superior 35 mm film scanning with VAROS.™**
Continuous tone colours in film pose challenges. Canon solves them with innovative VAROS technology. The scanner cover includes a built-in back light for film that reaches an extra large CCD sensor. Much like high-speed film, it has a relative light sensitivity up to 4 times greater than many 1200 dpi CCDs. Then VAROS uses two-pass scanning where the second pass is refracted by half a pixel. It activates automatically at resolutions greater than 600 dpi, capturing data that would otherwise be lost on a lesser scanner. The result is 1200 x 1200 optical dpi film scanning in less space and lower cost.









**Edit and store photos easily.**
ArcSoft PhotoStudio 2000 provides tools for editing photos, and ArcSoft PhotoBase creates an electronic photo database. Also included are Caere OmniPage Pro for OCR[3] (optical character recognition), plus Adobe Acrobat Reader and PDF manuals for Windows and Mac.

## CanoScan D 660U

**Just $299[RRP]**

3-YEAR WARRANTY OPTION

*Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

42 bit input

**Advanced photo scanning and colour capture.**
Photo print and text scanning resolution goes up to 600 x 1200 optical dpi with 42-bit colour input capable of capturing more than 4 trillion colours. Data can even be software enhanced to 9600 dpi.[4]

Canon

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CS9808/10

*Despite corporate interest, the Internet is about access, not advertising.*

# Wavering banners



**Sebastian Chan**

Sebastian Chan is an electronic culture and music critic. He can be contacted at diode@snarl.org.

A couple of years ago, many commentators on Net culture, myself included, were grimacing as a wave of corporate interest threatened to flood the Web. Many thought that banner ads would proliferate as advertising became the backbone of the once ad-free Net; that corporate portal sites would act as family filters, screening out all but the biggest shopping sites; and that the Net 'community' would dissolve as the Web became little more than TV. However, to our surprise, the Internet has not become more controlled, but more uncontrollable and less understood as it's expanded. The number of users (the audience) has increased many time over, but understanding of that audience, its habits and desires, remains at the level it was in 1997.

Banner advertising is on the decline. At present, it's a stop-gap measure while advertisers search for other means of reaching consumers. Banner ads are so widely ignored that those who sell them openly admit they are a failure; that no-one actually clicks on them. The big portal sites are also getting left behind as Internet users become more and more familiar with the Net and are building their own collections of bookmarks. The statistics, when they are publicly revealed, tell the same story. The huge numbers of users that 'default' sites like ninemsn appear to attract are more the result of people's inability to change their browser home pages, than of any real interest in the sites.

Contrary to predictions, the Internet hasn't turned into a giant shopping mall.

The most successful Web sites use the Net to bring together geographically separated physical audiences, rather than try to create new audiences. The latter have needed to be propped up by ever-increasing rates of cash burn, have declined or have failed altogether.

Ecommerce successes have not been large chain stores, but small niche shops. The Net has simply extended the reach and efficiency of their existing mail order systems. It draws in customers who would have used the shop anyway, if they'd lived close enough.

The success of the Internet is not based on convenience but on access. In other words, it's not the ability to order pizzas that appeals, but the opportunity to track down or post your own recipes. A specialist record shop selling rare music to a small but loyal global audience will get more value for the money it spends on its Web site than a large 'cater-for-all' online megastore that only knows its audience through the market research garnered from intrusive cookies, Web statistics and click-through advertising.

Contrary to predictions, the Internet hasn't turned into a giant shopping mall. The most successful sites bring together geographically separated physical audiences.

Compared to the real world, there is not a lot to be gained from size in the online world. In the real world, a chain store works by putting its presence in every shopping mall in every city, but this logic falls apart online. With good design, a small shop can appear the same size as its megastore counterpart. Moreover, because it already knows its audience's specialist needs, a greater proportion of its traffic will convert into sales.

Convenience drives fads, and fads pass quickly. Increasingly quickly. As yet, there's little demand for WAP and other such gimmicks, but it's probably easier for companies to push these 'technologies' than to get to the bottom of what the growing mass of Internet users actually want. If they asked, they might find that most people just want email.

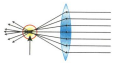
# Exceptional quality *for* graphics, design *and* web work, *just* $499.[RRP]

## ADVANCED CCD, 1200 x 2400 optical dpi, fast Galileo Lens, full 42-bit colour and optional high intensity film adaptor unit.

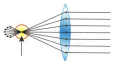


*Galileo Aspherical lens.*

**High-speed Galileo Lens, advanced CCD, more optically accurate.**
Superior performance begins with Canon's optical expertise. The five-element, aspherical lens system eliminates distortion. A shortened optical path and wide aperture lens (f-stop=5.5) increase scanning speed and improve signal to noise for a more optically accurate system. A true 1200 dpi CCD sensor is capable of finer detail and more accurate colour than "hit or miss" interleaved CCD approaches used by some competitors.



*Spherical aberration – Light converges at different points.*



*Galileo Lens – Light converges at a single point.*

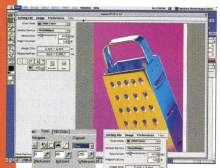


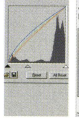

*ScanGear Toolbox CS offers "point and click" simplicity.*

**So advanced, so simple.**
The easy to use unit delivers studio quality 1200 x 2400 dpi optical resolution for almost the same price as many 600 dpi scanners. The USB interface connects to Windows 98/2000 and Mac OS systems.[1]

**Optional FAU-S11 film adaptor,[2] $199.[RRP]**

**High intensity film adaptor.**
The optional film-scanning unit replaces the standard cover for reflective and film scanning, and matches or exceeds the performance of expensive moving light source designs. The light source in the cover uses dual sheets of 3M™ BEF film (Brightness Enhancement Film) plus dual, high-intensity cold cathode fluorescent lamps for maximum brightness. It accepts colour negatives and positives in 35 mm, 2¼" and 5 x 4" sizes.





**Full 42-bit colour.**
True 42-bit input *and* output increases subtle tonal variation and colour accuracy. Photoshop 5.0LE, one of the few applications capable of handling 42-bit colour, is included. Advanced controls cover gamma settings, histogram adjustment, colour curves and more.

**42 bit input/ output**



**Full software suite.**
ScanGear control software, a universal TWAIN driver and Photoshop LE are included for Windows and Mac. Caere OmniPage LE for OCR is included for Windows. Caere PageKeeper for Windows and Caere ImageAXS for Macintosh create and access visual data bases.

*Canon Customer Care. The one-year warranty is upgradeable to three years or a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

3-YEAR WARRANTY OPTION

## CanoScan™ FB 1210U
**Just $499[RRP]**

Canon

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*Desktop camera prices vary wildly, so make sure you don't pay for more than you need.*

# In the picture

Like most digital video and still capture devices, desktop cameras have come down in price since they first appeared on the market. You can pay as little as $90 for a basic model, or just over $300 for a deluxe package. The variation in the price of desktop cameras is not only about image capture capabilities. It has more to do with the range of features each package offers.

To avoid paying for extras you'll never use, you should make a clear assessment of what you really need from your desktop camera before you go shopping.

As broadband Internet access products are being adopted more widely throughout Australia, the idea of using a desktop PC camera for face-to-face online communication is becoming more tenable. As exciting as this sounds, video transmission quality from most broadband products available on the Australian home user market is not high.

Using a fast PC, most desktop cameras are capable of capturing video at resolutions of up to 640 by 480 at around 30fps. However, transmitting and receiving video of this quality consumes far more bandwidth than a cable connection can supply. It's more realistic to expect your cable connection to carry a 320 by 200 image at around 15fps (or 3fps if you use a 56K modem).

This is well within the standard video capture specifications of most desktop cameras, so there's no point buying a top-shelf camera if you only intend to use it for Internet video-conferencing applications. However, there are a couple of exceptions to this rule. You might want a camera with a microphone — if only to avoid cluttering your desktop with wires and clunky boom apparatus — or you might choose a camera with a built-in motion sensor if you intend to use your camera for remote surveillance purposes.

If you intend to use your camera to create short videos for distribution (as opposed to transmission), you will benefit from buying a camera that has better picture quality and comes with video-editing software.

Most desktop cameras connect to your PC through its USB port. If your system doesn't have a USB port, or you're still using an older version of Windows 95 which doesn't support USB, it could be hard to find a desktop camera that works for you. If you're in the latter group, you will need to consider upgrading to Windows 98 or a later version of Windows 95, but if you're in the former, you'll have to hunt down a desktop camera that you can connect to your parallel or serial port.




## About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers. While we assume these are correct, we cannot accept responsibility for errors or omissions.

| Retailer | Contact | Model | Price |
|---|---|---|---|
| Australian Computer Recyclers | (02) 9747 0001<br>www.computeronline.com.au | Logitech QuickCam Express USB<br>Logitech QuickCam VC USB<br>Vcam CU68 | $95<br>$145<br>$100 |
| Forté | 1300 368 923<br>www.fortecomputers.com.au | Logitech QuickCam Express USB<br>Logitech QuickCam Pro 3000 USB | $89<br>$198 |
| Harris Technology | 1300 13 9999<br>www.ht.com.au | Kodak DVC325<br>Creative Video Blaster WebCam Go Plus USB<br>Creative Video Blaster WebCam 3 USB<br>Logitech QuickCam Pro 3000 USB<br>Logitech QuickCam Pro 3000 Parallel | $147<br>$312<br>$167<br>$212<br>$228 |
| Microstructure | (02) 9790 4109<br>www.microstructure.com.au | Logitech QuickCam Express USB<br>Logitech QuickCam Pro 3000 Parallel | $99<br>$332 |

# Colour fax *to* colour fax *without a computer.* $749.[RRP]



## Without a PC.

**The MultiPASS C70 is efficient, economical and easy to use as a stand-alone product with advanced fax, phone and copy functions.**

### Colour fax.
Send & receive colour fax to colour fax without needing a PC.

### Phone features.
Includes Telstra FaxStream® Duet compatibility to allow a separate fax and phone number on the same line. Answering machine interface. Automatic redial, 12 one touch, 100 coded speed dials. Auto switching for phone, fax, answering machine modes.

### Easy to use colour copier.
You don't need a PC for single sheet colour copies. As a sheet-fed B&W copier it prints up to 99 black & white copies of a single page in copy mode.

### High quality, plain paper fax.
Incoming faxes are printed on inexpensive, plain paper. Ink saver mode offers better economy, and in fax mode even detects that ink has run out, and saves the document in memory. A technology called UHQ™ smoothes the jagged edges common to many faxes. With plain paper your faxes can even be stored for legal documentation without needing to make a copy.

### Advanced fax features.
Delayed transmission, sequential broadcasting to as many as 113 locations, store up to 42 pages[1] in memory for incoming and outgoing faxes and more.

Handset included.

Fast black & white faxes in as little as 6 seconds.[1]



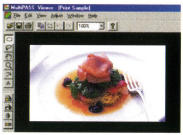

*Four-colour PC printing, high speed black and PhotoRealism.*

*A high quality four colour system with resolution up to 720 dpi is standard. Optional PhotoRealism™ offers photo printing with low density inks for more colour combinations with smoother tonal gradations. An optional dedicated black ink cartridge has 128 print nozzles for speeds up to five pages per minute.*[2]

## MultiPASS™ C70
## Just $749[RRP]

*Canon Customer Care.*
*The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.*

3 YEAR WARRANTY OPTION




*Colour scanner for your PC (up to 600 dpi enhanced).*

## With a PC.

**Connect to a PC for colour scanning, printer functionality and the MultiPASS Suite. The fully featured Windows desktop manager allows you to send and receive faxes, store them for later viewing or printing. Scanned images can be stored as thumb-nails for easy access and viewing.**



Canon

Price shown is recommended retail price including tax. Canon® and the Canon logo are registered trademarks and BJC, Bubble Jet, PhotoRealism, UHQ and MultiPASS are trademarks of Canon Inc. Microsoft® and Windows® are registered trademark of the Microsoft Corporation in the US and other countries. Telstra FaxStream® Duet is a registered trademark of the Telstra Corporation Limited. All other trademarks are the property of their respective owners. 1. Based on Canon Fax standard chart No.1 (A4, standard mode). 2. B&W print speed requires optional cartridge. Print speed may vary with document complexity and the processing speed of the host computer. Specifications are subject to change without notice. Canon Australia Pty Ltd ACN 005 002 951. ABN 66 005 002 951. C30808/12

## Your Letters

Write to Your Letters and tell us about your shopping experiences. Whether you want to vent frustration or relate a positive encounter, this is your opportunity to share it with other *APC* readers. The contact details are on the opposite page.

If your complaint letter is published, let us know how your complaint progresses. We'll publish updates on as many of these letters as possible.

Dear *APC*,
In Your Letters, November 2000 (see page 56) there was an update regarding Anne Daglish's problem with a computer restarting error. I also had this problem. It can easily be fixed by downloading and installing the Windows 98 SE Shutdown Supplement, from the Microsoft update Web site, or the corporate Web site at www.microsoft.com/windows98/downloads/corporate.asp.

More information on this problem can be obtained from the Microsoft support site in articles Q239887 and Q238096 at support.microsoft.com. Hope this information is useful in fixing this problem.

***James Rudd***
***Internet***

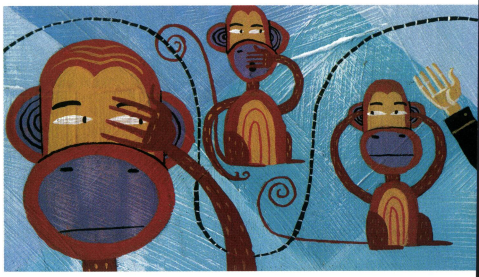
Dear *APC*,
I am writing in response to Chris Freeman's letter about Optus (see *APC* November 2000, page 54).

I must say that I am astonished at Chris' approach. Chris decided to opt for Optus pay TV and cable Internet, then immediately cancelled the Telstra and Foxtel services. Chris did not allow for any period of overlap or comparison in which he would have been able to evaluate options and retain service continuity.

It is useless to protest on the basis of company commitments. Companies are made of people relying on information given at a certain time and all four elements (companies, people, information, timing) are fallible. For the $100 or so saved on a non-overlap period, Chris left himself vulnerable, which is an unwise consumer choice.

So my advice to Chris is to use consumer choice and listen more to

# Help me if you can



You've read the brochure and searched the site, but the information you want is not there. In frustration, you give up and go hunting for the phone number. Waiting on hold doesn't appeal to you, but it seems that the only way you're going to find out what you need to know is by speaking to a person trained to deal with enquiries.

However, what do you do when the last thing the person on the 'help' line wants to do is help?

*APC* received the following letter from a reader.

Dear *APC*,
**Are technical support and enquiry lines getting better? I must say I have had very pleasant experiences with Toshiba support, but I have recently had a gruelling and unfriendly experience with 3Com. I wanted to buy two 10/100 Fast Ethernet and 56K modem cards (two cards in one), and thought 3Com products were reliable and reputable, so I decided to check out what was available.**

**I tried to find out the information I needed by looking on their Web site but I was unable to tell the difference between four models, all of which claimed to be 56K (no mention of V.90 or not) and 10/100Mbps.**

**I then decided to call their product information line for help. I wanted to check that the cards were Type II PCMCIA, and wanted to know about specific differences between the cards so I would be satisfied with my purchase.**

**I don't know if it's just me, but I like to know what I'm buying and why a model, seemingly with the same features, has a different model number and different pricing. I tried to make it easier for the support staff by having specific model numbers ready.**

**The person on the other end (who will remain anonymous) was nice, took down the model numbers and told me he would do some research and call me back by the next day. I waited patiently for a few days, but the call never came.**

**Unperturbed, I called again, thinking the person had forgotten to call me back or had written down the wrong phone number. I presumed the person who picked up the phone on the other end was the same person I had talked to before, but he hung up on me immediately I began my question.**

**I called back again, and by coincidence, the same person picked up. He questioned my motives for needing to know the specifications, and after I had explained, he told me that he had better things to do than help me. He also said that I should get the 656C because it was the latest model.**

**He wasn't interested in helping me or supplying information. All I wanted was information on the specific PC cards and their differences so I could make the right choice. However, the assistant basically told me, in a tone I didn't like, that there wasn't any point in finding out the differences — just go for the newest and latest — even if there's a card that**

*Help lines are supposed to provide help, right?*

***By Roulla Yiacoumi***



Illustration by Christopher Nielsen

seems to be the same thing but cheaper. He said he couldn't be bothered to help me and then he hung up.

Unless I am seriously misled, product information lines are for those willing to buy the product, but who want some extra information. In contrast, technical support lines are for people who have already bought the product and need technical support.

If this is what 3Com's product information line is like, what on earth can its technical support line be like, considering that it's already got the money from the sale by the time people ring up?

This experience has made me seriously reconsider buying a 3Com product again, and whether I will ever recommend 3Com to anyone. I hope none of your readers experience this.

*Joe Liu*
*Sydney, NSW*

*APC* forwarded this letter to 3Com for comment and received the following response.

Dear *APC*,
We're sorry that Mr Liu had problems finding product information, which should be a straightforward request. Like him, we believe people should be able to expect the highest level of service.

As it happens, at the time he experienced the problem we were undergoing extensive changes to our customer service processes and have now finished revamping the way we communicate to customers. These new processes will ensure that this doesn't happen again.

3Com's new, better customer service is in line with our new focus on radical simplicity. As part of that, we're updating our Web site to make information easier to find. In addition, we're updating product names to make them simpler to understand.

To help Mr Liu in this instance, we've invited him to contact our product marketing manager who will personally help explain the different products and find the right one for his needs. To make up for the inconvenience, we have offered Mr Liu the right cards at no charge.

*Michelle Kinna*
*Marketing director, 3Com*

Joe contacted *APC* to say he received the two cards from 3Com at no cost. *APC* would like to thank 3Com for its courteous response and generous offer to our reader.

**Have you tried calling a company for product information, only to be lobbed off? Have you emailed a business for information, then never heard from them again? Write to me at ry@acptech.net or Service & Reliability, APC, PO Box 4088, Sydney NSW 1028. Letters may be edited for length or clarity. We regret that not all letters can be answered personally.**

## Your Letters

what's pragmatic than what the ads say. Realise that human beings respond best when fallibility is accepted. Leave the culpability chases to the media and politicians.

*Scott Trembath*
*Essendon, Vic*

Dear *APC*,
I purchased your magazine for the first time based on the headline of the best and worst ISPs (see *APC* November 2000, page 70). My goal was to find a better ISP than Telstra BigPond, which I am currently connected to. What a surprise to find that BigPond rated so highly! Obviously the Canberra market did not respond in droves, otherwise the situation with your survey may have been significantly different.

I have been connected to BigPond for over four years and until recently was one of its happier customers. This was until I began getting repeated disconnections and an error message stating I had been disconnected by the remote server. Trying to dial up is now a hit and miss affair with repeated messages stating that the remote server is not responding.

I have now upgraded my laptop and installed a card modem in that, and to my surprise, I am continually disconnected by the remote server. BigPond insists it is a problem with my PC, and as far it's concerned that is the end of the story.

I can't wait until your next survey so I can contribute to the results and maybe give a truer picture of the ISP situation as it stands in my household.

*Pat Jones*
*Canberra, ACT*

Dear *APC*,
I was interested to read the letter from Chris Walker (see *APC* November 2000, page 54) about the problems he is having with Adelong answering emails. I have also had a run-in with the company so I sympathise. My advice is to bypass Adelong if at all possible, as their service for returning items is appalling.

*Nick Ramshaw*
*Internet*

*Little is known about mad cow disease and the mysterious prion that causes it.*

# Mutated prions puzzle scientists

In November last year, the report from Britain's public inquiry into the handling of the mad cow disease epidemic was released. Led by Lord Phillips, the inquiry resulted in a lot of finger pointing and accusations. It also emphasised how little we know about the group of diseases mad cow disease belongs to. Transmissible spongiform encephalopathies (TSEs) are the cause of scrapie in sheep and goats, Creutzfeldt-Jacob Disease (CJD) and variant Creutzfeldt-Jacob Disease (vCJD) in humans, and of course, BSE (bovine spongiform encephalopathy) or mad cow disease in cows.

TSEs spread within the brain and spinal column, gradually creating clusters which produce sponginess in the tissue. In humans, this damage causes numbness and mood swings, followed by hallucinations, uncontrolled tremors, loss of motor skills, unbearable pain and eventually death. Scrapie got its name from the fact that it also causes an itching of the skin, leading sheep or goats to scratch constantly and scrape away the coat and skin. It can be years from the date of infection before the first symptoms of a TSE begin to manifest themselves, and once infected, there is no way to halt or control the spread of the disease. Of all of the TSEs, vCJD and BSE have been getting the most press in recent years. This is because of the mad cow crisis in Britain and the rising number of vCJD deaths.

We've been lucky in Australia as we've had no outbreaks of TSE, aside from two individual cases of scrapie in sheep imported from the UK in 1952. The sheep were destroyed before the disease could spread. Australia is currently classed as a category one country, meaning that animals from here are deemed 'highly unlikely' to have the disease.

## What are prions?

A frightening aspect of TSEs is that they are not typical diseases and cannot be controlled. Infections are usually caused by bacteria, viruses or by cell mutation which uses DNA or RNA to replicate and gather proteins to survive. However, TSEs do not behave like any of these infectious agents. Experiments conducted in the early '70s subjected sheep scrapie to ultraviolet and ionising radiation. This usually kills DNA and RNA, but had no effect on the infectiousness of scrapie. The scientific community was at a loss.

Then an investigating team led by Stanley Prusiner put forth a controversial idea. They hypothesised that the infectious agent was not RNA or DNA reliant, but something never seen before — an infectious agent composed entirely of protein. The concept of proteinaceous infectious particles (prions) was met with scepticism. After further experiments that break down or unfold protein reduced the infectiousness of scrapie, the idea became widely accepted. Further examination of the scrapie prion showed that it contained a single protein that was later dubbed PrP — short for prion protein.



Genetic testing revealed that mammal genes code for PrP. Scientists concluded that PrP is a normally-occurring substance, and that the diseases are caused by a mutated version of it. To date, *all* mammals tested have a gene that codes for PrP. The role that PrP plays in the body is so far unknown.

The infectious and benign versions of PrP are very alike, except for a difference in shape. When the mutated prion comes into contact with a normal PrP, it causes it to fold into the mutated form. This new prion is not absorbed like normal PrP and as it spreads it accumulates. This leads to the clusters that make the brain tissue spongy. Because PrP is naturally occurring, some believe that mammals are capable of developing TSE spontaneously, independent of transmission by inheritance or from an infected animal. This view is controversial at present.

## The mad cow fallacy

The biggest public misconception about mad cow disease is that it was caused by animal feed made from infected animals. Ruminant by-products were used in feed for chickens, fish, sheep and cows, but this did not literally *cause* mad cow disease. However, it did spread the infection on a large scale. A pea-sized piece of infected tissue is enough to pass the infection through ingestion, from sheep to sheep, cow to cow, and even sheep to cow and vice versa. The spread from cow to human has still not been conclusively proven.

Iatrogenic infections have been the second major cause of transmission in humans, behind inherited infection. Iatrogenic infections are those caused by medical procedures, for example, by the use of implements infected by prions that have survived sterilisation in medical autoclaves.

Scrapie, BSE and vCJD are not caused by the same prion. Eating BSE-infected meat does not cause scrapie in sheep, or a sheep form of BSE, but the sheep can become a carrier of the disease. The BSE infection can then be passed back to cows if infected sheep by-products are used in cow feed. This is how the infection was able to spread so devastatingly in Europe. Because the incubation period for BSE is so long, it is only by luck that Australia didn't have a similar outbreak.

***Darren Ellis***



# Think of it as a gift from Corporate Australia to you.

The lease is finished and they're keen to replace it. And you need a low cost, big name PC capable of running your applications and connecting to the internet. Perfect - now their loss is your gain at pcauction.com.au.

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So connect to pcauction.com.au, make a bid and bag yourself a bargain. It's simple, it's fun, and it's where the price is so low it feels like a gift - directly from Corporate Australia to you. See you there!

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TOL0508

# APC's best

*There were some dramatic changes to the technology landscape during 2000. Exciting new releases and major disappointments combined to produce a memorable year.* APC *covers the disappointments on page 68, but here is the best of 2000.*




Once a year, *APC* takes time to reflect on the developments in technology that occurred in that year. The *APC* awards are our opportunity to recognise the most significant of these products and services.

The decisions *APC* makes about the awards always involve intense debate among staff. The categories are reviewed, and the finalists and winners are considered closely. This year, we came up with five categories in addition to our major award, the Breakthrough Award.

The Technology Innovation 2000 award recognises new and exciting uses for technologies. Consumer Product of 2000 acknowledges success in making computing easier and more rewarding for everyone. Mobile Product of 2000 encompasses everything from handhelds to notebooks and MP3 players. Corporate Product of 2000 recognises products that enhance enterprise computing in all its forms. Finally, the Just Plain Cool Award is *APC*'s opportunity to acclaim the coolest technology products we have encountered in the last year.




## Breakthrough Award

### Optus@Home Cable Internet

This award recognises the benefits that Optus has brought Australian Internet users in Australia by making high-speed Net access more widely available and affordable.

Optus@Home was the first broadband service to offer flat monthly pricing, and the service initially included unlimited downloads. In response, Telstra introduced unlimited download plans for its competing BigPond Advance services, but these had — and still have — speed limits. Although Optus provoked an outcry from its customers when it introduced variable download limits in September, this award acknowledges the dramatic impact Optus@Home has had on the broadband space.

OPTUS @ Home

# of 2000

## Technology Innovation




### Gnutella

**Gnutella** created an almost unsinkable model for peer-to-peer file sharing. This tiny but extremely powerful program has revolutionised file sharing. Gnutella is popular for swapping MP3s, but has a vast range of other uses. It can transfer files of any type and is open source.










### Finalists

**AMD's Thunderbird Athlon** continues to extend the parameters of fast and effective processor design.

The **Sony CD-R Mavica** digital camera uses mini CDs as a storage medium for high-quality images and video.

# Consumer Product of 2000

## Optus@Home Cable Internet

Since the launch of **Optus@Home**, many broadband options have been introduced in Australia. Still one of the best value services available, Optus@Home changed the face of Net access in Australia. This is why it earned *APC's* Breakthrough Award, as well as the award for Consumer Product of 2000.




OPTUS @ Home




## Finalists

**Linux Mandrake** has played a key role in moving Linux away from its command line origins and making it a viable competitor to Windows in the desktop arena.

**Sony PlayStation2** provides high-quality gaming, DVD and Internet access in a lounge room-friendly package.







Linux Mandrake™

# Mobile Product of 2000

## Compaq iPaq Pocket PC

The **Compaq iPaq Pocket PC** blurs the dividing line between a standard PC and a handheld system. It runs at 206MHz and has a superb colour screen. Besides being fast and functional, it has a funky design.









## Finalists

The **Diamond Rio 600** has set the pace for MP3 players, helping to transform them from mere oddities to key entertainment devices. The portable player comes with 32M of standard RAM and can be upgraded with SmartMedia or CompactFlash memory.

A combined mobile manager and phone, the **Motorola Accompli** is a compact but powerful new player in the handheld computing market.



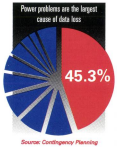




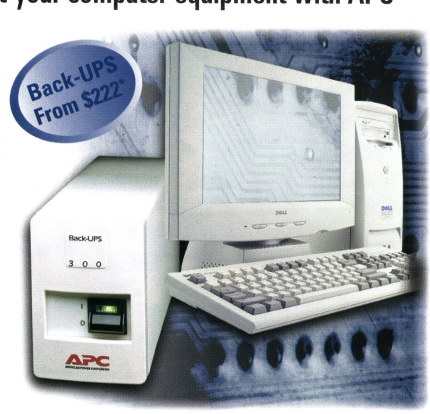


# Because power problems are the biggest cause of hardware and data loss, protect your computer equipment with APC

According to a study by IBM, your PC system is subject to an average of 128 power disturbances per month. Power problems range from the subtle — keyboard lockups and frozen monitors — to the serious — hardware damage and complete data loss due to surges and blackouts.




Protecting your home PC or small business' valuable data against power problems is simple with the award winning APC Back-UPS, the reliable and affordable power protection solution designed especially for your PC. Remember, when it comes to power problems, it's not "if", it's "when".




## APC Back-UPS award-winning features include:

- **3 outlets** provide instantaneous battery back-up and surge suppression for your PC, monitor and an additional peripheral to work through power outages and sudden voltage dips without losing your files. During extended power outages, Back-UPS gives you enough time to save your work and shut down your computer properly
- **1 Surge protected outlet** protects your laser printer from damage due to surges and spikes
- **Lightning and surge suppression** to protect your computer and its peripheral equipment from catastrophic damage
- **Noise filtration** Back-UPS protects against high frequency electrical noise that can damage files and create software errors
- **Quick battery recharge** enhanced charging technology allows Back-UPS batteries to recover from power outages as fast as possible, and ensures they are ready for the next power event

### Recommended by network and electronic vendors worldwide

APC power protection solutions are recommended by network and electronic vendors worldwide. Microsoft, NEC, IBM, Novell, HP and other vendors stress the importance of protecting workstations.

### APC has won more awards for reliability than all other vendors combined

For a very small investment, you receive the best value in power protection, securing your expensive PC, peripherals and data, whilst providing you with complete peace of mind.

All APC products have a 2 year warranty, backed by free comprehensive Tech Support. Contact APC today and find out how the company that protects over 8 million satisfied customers worldwide can safeguard your system.

Visit us at www.apcc.com for more information and our Dealer Locator to find your nearest APC reseller.

## WIN a Back-UPS 300!

To be in the draw to win a Back-UPS 300, simply fill in the form below, or register on-line at promo.apcc.com.

APC®
Legendary Reliability™

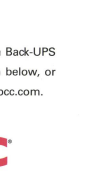
Name: _____
Job Title: _____
Company: _____
Address: _____

City/Town: _____
Postal Code: _____
Phone: _____
Fax: _____

E-mail: _____
How many PCs do you want to protect? _____
How many servers do you want to protect? _____
Your organisation is:

- ☐ Small/Medium Business (less than 200 employees)
- ☐ Corporation (more than 200 employees)
- ☐ Computer Reseller/VAR

**FREE Back-UPS product information and enter me in the draw to win**




- ☐ YES! Please send me FREE APC Back UPS product information and enter me in the draw to win a Back-UPS 300.
- ☐ NO I'm not interested in purchasing APC Back UPS. Please add me to your mailing list.

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*** Recommended Retail Price including GST**

# Corporate Product of 2000

## Microsoft Windows 2000

This long-awaited Windows update promised and delivered the kind of ground-up stability that businesses had been crying out for. Microsoft took the Windows NT kernel and added features previously only available in Windows 98. **Windows 2000** is the result.







## Finalists

The fast and flexible **Enterasys RoamAbout** wireless networking system is helping to expand cordless computing options in the office.

The **Quantum Snap Server** is a neat solution for rapidly expanding file server demands.







# Just Plain Cool Award 2000

## Rome MP3

This light and portable MP3 player is shaped like an audio cassette, so you can instantly use it in your car. In fact, the **Rome MP3** works in any cassette player. It has a clever design and excellent audio quality.










## Finalists

The **Apple G4 Cube** looks ultra-groovy in its clear cube case.

The **Probotics Cye-Sr** is a home robot that can learn the layout of your house, do your vacuuming and bring you a beer when it's finished.






# WinRoute

# Size doesn't matter.

PROFESSIONAL FIREWALL

It's the solution that counts. And regardless of the size of your network, WinRoute Pro is the firewall solution that won't leave you wanting...for extra features, that is. At the core of WinRoute is our advanced NAT router with a packet-filtering firewall engine, combining ironclad security with flexible implementation options.

Whether you connect to the Internet via dial-up, ISDN, ADSL, cable, satellite, or E1, WinRoute Pro can protect your connection, while making network management a snap with our built-in DHCP server and remote administration utility. But we're not talking about a proxy server that poses as a firewall. WinRoute Pro is ICSA certified, with advanced security features like port mapping and stateful packet inspection.

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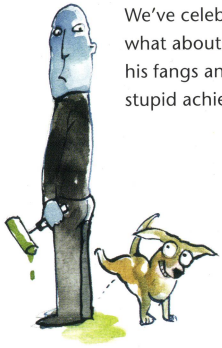
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# Dogs of 2000

We've celebrated the best technology achievements of 2000, but what about the stuff that sucked? **Angus Kidman** sharpens up his fangs and checks out some of the year's more dubious and stupid achievements.



## Pentium 4 problems

The Pentium 4 was a much-delayed and not terribly fast misstep for Intel (see First Take Special Report, page 30) in a year that also saw other embarrassments, such as the 820 chipset debacle (a memory slot in many motherboards didn't work) and the recall of 1.13GHz processors (a bug rendered some benchmark programs inoperable). Intel is still confidently predicting that the Pentium 4 will be the main chip in the market by 2002, but it's going to need to do some heavy work to see the most performance wrung out of the chip. With AMD aggressively breathing down its neck, this is a problem Intel could do without.

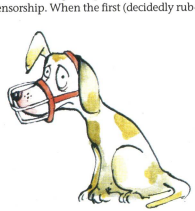


## Telstra's broadband pricing policy

Telstra's approach to pricing for broadband services — cable, ADSL, ISDN, satellite — seems to be based on the following simple formula: think of a ridiculously high number; double it; apply per month. If anyone complains, mutter a lot about shareholder value and the fortune Telstra has invested in alleged infrastructure for the benefit of all Australians. Whatever you do, don't lower the price. Of course, having once been a monopoly means never having to say you're sorry.

## Internet censorship

The government has a rather interesting interpretation of 'success' when it comes to Internet censorship. When the first (decidedly rubbery) figures on the Internet censorship scheme were released a mere nine months after it started, officials decreed that a system which had only managed to identify and shut down 62 'offending' sites was an outstanding success. When *APC* did a quick check using a search engine, we found roughly 7 million potentially offensive sites. Drop in the ocean anyone?



## Bitten by the ASP

OK, all companies in this room actually renting and accessing software applications online, put your hands up. My goodness, there are actually five of you! Aren't those lovely little ASP companies doing well? No. Shamelessly hyped for the past two years, ASP appears to be all but dead in the water, despite the fact that major software companies such as Microsoft are now talking about application rentals sometime next year. Our breath is not bated in any way.

## Technology stocks

Some technology stocks were dog food even before the market correction (LibertyOne and almost anything that used to be a mining company spring to mind), but April's market crash hit pretty much everyone regardless of their long-term prospects. Devastatingly painful for investors who thought their fortunes were assured when they plunged their savings into What Mining Not Us Tech Com WAP B2B, at least this reminded people that there's no such thing as a sure thing.

## Technology stock analysts

One of the less logical consequences of the market crash was that everyone suddenly seemed to decide that even obscenely profitable companies like IBM or Compaq deserved a good kick in the stock market pants. This was not because they'd failed to make money, but because they hadn't made the precise amount of money predicted by Wall Street analysts, didn't grow fast enough, or annoyed the broker who suddenly decided to write a 'downgrade' report. Our view is this: brokers play with imaginary money; toddlers play with imaginary friends. The similarities don't end there.

## ISP buyouts

Buying an ISP can be very bad for your health. Just look at what happened when the OzEmail consumer business went on the block. First Telstra had a nibble, before getting slapped around by the ACCC (something it should be used to by now). Then EISA had a go, but stuffed up its financing so spectacularly that it sent itself into liquidation in the process. All kinds of companies got singed, including Disney, Fairfax and the apparently inescapable Microsoft.

## Gagging on the GST

Remember how the GST was supposed to make PCs cheaper? Checked out the price of PCs lately? OK, we know the exchange rate has had an effect on prices, but if the world markets trusted economic policy down under, this probably wouldn't be such a problem. Enjoy those tax cuts, kiddies.




## Optus's broadband usage policy

Optus's willingness to introduce an all-you-can-eat policy for its Optus@Home service had such broad ramifications that it earned the company our Breakthrough 2000 award. This makes its decision in October to introduce limits on the service all the more inexplicable — and stupid. The confusing policy requires people to track their own usage over a 14-day period, and to pay extra if they exceed the average. It doesn't provide any warnings if they exceed this average, which appears to be calculated using a formula borrowed from a nuclear physics laboratory. All this is likely to make many users throw in the towel. And who can blame them?

## Internet appliances

The name is a dead giveaway, really. When you think appliances, you think toasters, and who can get excited about those? Despite being hyped endlessly, few Net appliances on sale this year managed to provide a compelling alternative to the PC. No doubt, we'll eventually be using non-PC devices to access Net services, but don't expect any of this year's models to be around when it happens. And did anyone actually care about Stephen King's endless and futile attempts to promote the ebook?

## The US legal system

Always problematic, the US legal system slipped into downright pointlessness as 2000 dragged on. On the one hand, obvious abuses of power by companies like Microsoft (doesn't the Word spellchecker look for the word 'antitrust'?) were allowed to slip into a parallel universe of unresolvable appeals. On the other, the US recording industry came perilously close to shutting down Napster, an application people actually want to use. Good luck, guys; you're gonna need it.



## WAP saps

Wireless Application Protocol is a great idea, but a fiddly reality. It's one thing to type short text messages into a phone, but typing in a long Web address or a decent length email using only nine keys soon gets tiresome. Anyway, do you really need to be able to go shopping any time you can raise a mobile signal? The nastier estimates suggest that only about 10,000 Australians have subscribed to WAP services, and this in a country where pre-schoolers can be seen with mobiles clamped to the sides of their heads. Clearly, no-one's very impressed.

## Windows Me

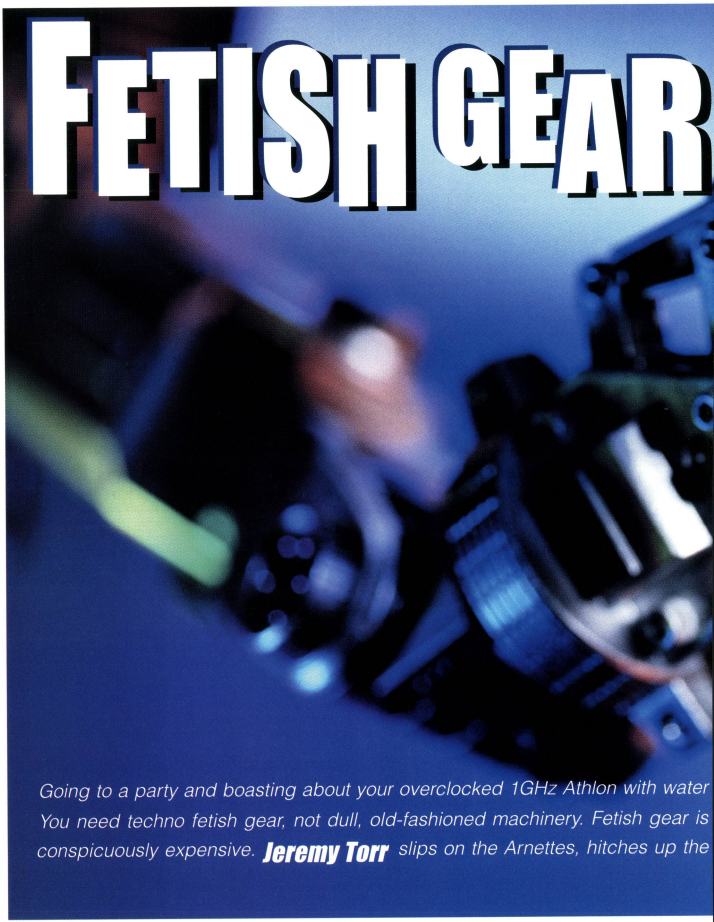
According to Microsoft, the 'Me' either signifies the highly personalised nature of the latest Windows non-upgrade, or stands for Millennium Edition. We can think of some rather more appropriate interpretations for this blink-and-you'll-miss-the-changes Windows 98 clone:

- Massively exaggerated
- Mainly execrable
- Many errors
- Miserable excuse for a *??%

## Pathetic patents

Hey, here's a thought. If we go out and get patents on a few of the more obvious aspects of Net business — say, hyperlinking or allowing people to buy stuff just by clicking on something, or charging tax on an international transaction — we'll be rich. Oh damn, somebody's already beaten us to it! When even the patent authorities are admitting that the system is flawed, and are considering dumb proposals like the ones quoted above, it's time for a major overhaul. Any volunteers?

# FETISH GEAR



*Going to a party and boasting about your overclocked 1GHz Athlon with water*

*You need techno fetish gear, not dull, old-fashioned machinery. Fetish gear is conspicuously expensive.* ***Jeremy Torr*** *slips on the Arnettes, hitches up the*




cooling and DDR-RAM-equipped video card is out. portable, groovy, accessible, and best of all, it's Hilfigers and steps out in digital style.

Over the last two years, *APC* has become a cool read. Sit on a plane, chill in a waterfront cafe or hang out at the skate park and you are likely to see that familiar cover. The popularisation of the Internet and the increasing number of computer magazines have a lot to do with technology becoming cool.

However, to be really hip, you need the right gear. Swapping MP3 stories, ringtone programming tips and digital images by infra-red is definitely sharp.

The main trend is for portability and connectedness. This has been given a dramatic boost by improvements in battery technology and smarter, thinner, less power-hungry chip design. Most portable devices now opt for rechargable lithium ion or lithium polymer batteries, which offer excellent power and cycle life without any irritating memory effects. Check out devices like Casio's MP3 watch (*APC* November 2000, page 38), Iomega's HipZip MP3 player (*APC* December 2000, page 38), the Palm series and the majority of new phone/organisers.

Chips are also shrinking dramatically due to advances in general purpose chips and application-specific integrated circuits.

Another important development that has favoured high-tech gadget development is the introduction of smart control systems. In the past, even a basic LED wristwatch required a degree in programming to operate. Today, logic chips provide a series of simple controls, usually linked to a clear LCD screen with soft menu choices. This allows for much more sophisticated control systems without requiring users to memorise multiple button sequences.

The other major change in groovy gear has been in design. Gone are cream boxes with tiny coloured buttons and an LCD screen like a readout from a breath tester. Today's feedback gateways (don't call them screens!) are ovoid, with full-on graphics and muted backlight colours ranging from pink to blue to *X-Files* green.

They vibrate, take voice commands, talk back to you and incorporate sensors for movement, position and temperature. Design has gone beyond appearance. Probably the most important aspect of all these devices is that they are connected.

No more rising panic if your walkman goes missing — the MP3 songs are on your PC anyway. Lost your diary? The backup is at home. You can stay in touch with colleagues and friends 24 hours a day.

Almost no devices *APC* looked at in this review are designed to be used on their own. Even the Crumpler bag comes with a hole for your mobile phone hands-free connection. With the right technology, you are never alone.

## Casio Pro Trek PRT-2GP

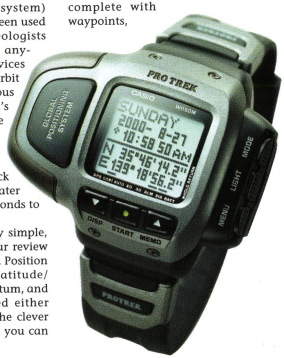
Lost? Strap the handy Casio Pro Trek PRT-2GP to your wrist. It gives the time, day, position and altitude accurate to within 10m, and can also show you the route you've taken and the way home.

GPS (global positioning system) receivers are not new. They've been used for years by the military, geologists and sailors to track positions anywhere on the planet. The devices lock on to a series of 27 low-orbit satellites transmitting continuous position signals across the earth's surface. The receivers trace signals from a minimum of three satellites to determine their position.

The Casio Pro Trek can track up to 12 satellites at once for greater accuracy, and takes only 40 seconds to give a fix on its compact LCD.

The controls are surprisingly simple, which is lucky, because half our review model manual was in Japanese. Position data can be selected from latitude/longitude, UTM or local map datum, and the readout can be displayed either numerically or — and here's the clever bit — on a moving map which you can zoom in on.

It's more useful than many larger GPS units thanks to the RS-232 PC connector built into the battery charger. This allows scanned and rasterised maps to be uploaded into the watch's memory, complete with waypoints,




landmarks and intended track. Very clever indeed.

The only problems with the device are that the size of the screen means lots of squinting and zooming in and out to identify locations, and waypoints can't be named (they can only be allocated identifying symbols). It's easy to mix them up as a result, and displays can get very crowded and confusing.

Motive power is supplied by a built-in lithium ion battery that is good for about 3.5 hours of continuous GPS work or several weeks in watch mode. The charger can be mains or battery powered, so remote operation isn't a drama.

The device is also waterproof to 50m.

**Pros** Ultra compact
Fast satellite fixing
Map upload
**Cons** Expensive
Small map screen

**Contact** Shriro
**Phone** (02) 9370 9100
**Online** www.casio.com
**Price** $1,360

## Logitech iFeel Mouse

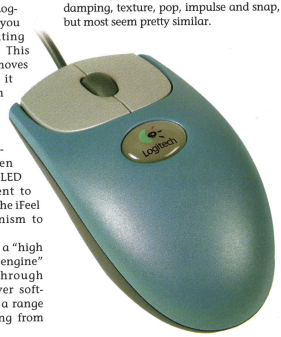
The computer mouse is a simple and effective feedback device. You move it; the cursor moves. You click the button; the onscreen menu or button reacts.

However, peripherals maker Logitech has developed a way to get you more involved in your computing environment: the iFeel Mouse. This new, iridescent rodent not only moves the cursor around the screen, it behaves as though every object on the screen is three-dimensional, and lurches and whirs when you move the cursor over it.

Looking like a standard USB-connected and optically driven mouse (no moving parts, just an LED and an optical sensing element to determine direction and speed), the iFeel Mouse uses a built-in mechanism to make it shudder as you work.

According to the blurb, it uses a "high fidelity Inertial Harmonic Drive engine" to provide tactile feedback through Immersion Corp's custom driver software. This allows you to dial in a range of vibra-feedback modes ranging from Rocky Road and Sticky Gum to Sonic Vibe. You can also use any custom variation you like.

Settings options include gravity, spring, damping, texture, pop, impulse and snap, but most seem pretty similar.




As the mouse moves the cursor over a menu, pop-up or dialog, it gives a detectable nudge in the hand, confirming that the mouse is where you want it to be. This is jolly, but not much more useful or accurate than using your eyes.

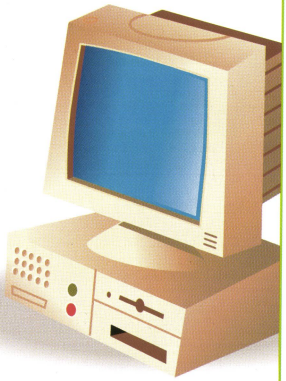
Irritatingly, the install software slaps an eBay link onto your desktop without asking, and comes with instructions even more terse and unhelpful than the Nike psa[play. This can be a hassle if you have an early USB controller and a PS/2 mouse clashing for control. Also, the feedback programming seems limited to desktop applications at present. Obviously, it would be brilliant for games. Overall? It might be interesting when it's finished.

**Pros** Good talking point
**Cons** What's the point?

**Contact** Logitech
**Phone** (02) 9972 3711
**Online** www.logitech.com
**Price** $99

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## Nike psa[play 120





Looking like something Sigourney might have trodden on in *Alien*, the Nike psa[play is a wearable technology-lover's dream. It comes with enough ovoid curves, rubber and velcro to make the laziest jogger hop with excitement, and then there's the LCD readout, stainless steel belt clip and compatibility with both Mac and PC.

Based on the Rio 800 digital audio player, the psa[play has 64M of internal memory and an MMC expansion slot capable of expansion up to 128M. That's about enough for four hours of top-quality outdoor listening.

The main unit is very compact, with a totally sealed, rubberised front control panel. All the main controls are operated through this tough, sweat-proof membrane. This is a bit pointless considering the back panel has no sealing whatsoever and slides off to reveal the main PCB and battery slot. Don't think the unit is remotely damp-proof — it isn't. However, there is a rubberised backplate on the stretch armband mount which might keep things a bit drier.

Instead of a status LCD, the unit has a wired remote with its own LCD display which plugs into the USB/audio socket. The remote has another headphone socket and clip, so you can wire yourself gloriously from pants to singlet to ears. However, the headphone wires look a little flimsy for protracted folding.

The foldable headphones are very light and produce excellent output quality, making them ideal for outdoor use. The accompanying CD loads a rebadged RioPo1. ripper/manager/loader utility, which does everything simply and flawlessly. USB file upload is equally straightforward and fast. The equalisation functions should satisfy most tastes with rock, jazz, classical, book, flat, normal and rap settings provided.

Surprisingly, there is no option for program play, bookmarking or random track selection. The supplied manual is rather skimpy and its description of initial installation is confusing.

Apart from these niggles, the psa[play pack has excellent quality, superb design and top audio quality up to 320Kbps — with variable bit-rate playback as well. This is a techno gadget from heaven.

**Pros** Excellent sound quality
**Cons** Flimsy headphone wires
Joke waterproofing

**Contact** Nike
**Phone** 1300 656 453
**Online** www.nike.com
**Price** $599

## Samsung Digimax 35 MP3




A camera, an MP3 player and a Webcam all rolled into one tiny package? Incredible. The Digimax 35 MP3 is smaller than a disposable film camera, looks stylish in its silver and iMac-blue finish, comes with headphones and a 16M CompactFlash card — and sells for only $499. Not bad value.

However, quantity is no substitute for quality. This is where the Digimax 35 starts to fade a little. If you want to see some really grotty digital photos, stroll outside and take a low resolution snap or two. You'll get numerous coloured artefacts, an overall lack of sharpness and the tonal range of a brown paper bag. High resolution improves things a little, but the auto-exposure system can't manage anything beyond medium contrast subjects.

The MP3 capability is a bit better. Loading audio tracks onto the Flash card automatically puts the unit into player mode and the tiny top panel buttons automatically revert to track selectors and volume controls.

Uploading is easy using the supplied do-it-all e-Max software. Playback quality is reasonable through the layback headset, but you can only load half a dozen tracks and a few photos on the RAM card. No ripper software is supplied.

The Webcam function refused to work on our PC, despite repeated attempts and the manual's exhortations to "turn off power switch before plug in". We were unimpressed by the confusing instructions and convoluted processes for software setup.

However, the USB drivers worked fine first time, and the software is surprisingly capable once loaded. The kit comes with a USB cable, a Webcam stand and 3D glasses to complement the bundled 3D and animation software. The two AA batteries lasted for about a day.

If you are desperate for an all-in-one portable media device, this is the gadget for you. If you want a decent MP3 player, digital camera or Webcam, forget it.

**Pros** Multifunctional
Convenient
**Cons** Not very good at anything

**Contact** Samsung
**Phone** (02) 9428 9666
**Online** www.samsungcamera.com
**Price** $499

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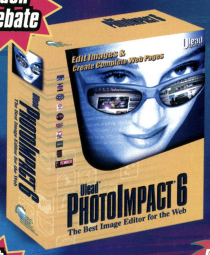



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## Crumpler Wack-O-Phone



This is a strange name for a very useful notebook carrier. The Wack-O-Phone hides plenty of practicality under its devil-may-care exterior.

The tough-feeling Cordura Plus material is available in a range of trendy pastel shades and padded with foam in all the important places. The outer flap is long and capacious, and has two-way click-buckle or velcro fastening for rapid and ultrasecure closures.

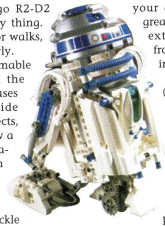
It has a decent range of extra pockets and compartments, with a separate notebook stabilising flap. This is a bit too big, and requires a lot of deep-bag grovelling to fix properly. It also lacks a separate external document sleeve, which is a must for all multimedia directors. The shoulder strap looks chunky enough to support the harbour bridge, and is infinitely adjustable in length. Overall, the quality is excellent.

If you need a groovy notebook bag and don't want to kill cows to get one, the Wack-O-Phone is the only answer.

**Pros** Tough, stylish
**Cons** No external pocket
Over-long retaining flap

**Contact** Crumpler
**Phone** (03) 5331 6576
**Online** www.crumpler.com.au
**Price** $220

## Lego Droid Developer Kit



Want a new pet but don't like the cleaning up? The Lego R2-D2 Droid could be the very thing. You can even take it for walks, provided you walk slowly.

Based on a programmable microprocessor called the Micro Scout, the Droid uses a light sensor to guide itself around tricky objects, and can be set to follow a selection of programmable routines. A built-in motor powers its walking system.

If you're really into in robotics, you can tackle the Robotics Invention System. Enhance your droid with touch sensors for greater sensitivity and program the extended microprocessor brain from your PC through a special infra-red download link.

All the Lego MindStorm (micro-controlled assembly) kits come with the usual five-hole blue, 20-hole yellow and six-tooth cog bits. They also have groovy-looking ribbed pipes and CD-ROMs with programs and instructions to get you started.

Assembly is no more complex than with standard Lego, but some of the programming requirements are a bit glitchy, and some push-fit sensor connections are rather delicate. Don't run the droids on rough carpet if you are low on battery stocks; they drink electricity.

**Pros** Easy to build
**Cons** Fiddly to program
Delicate sensors

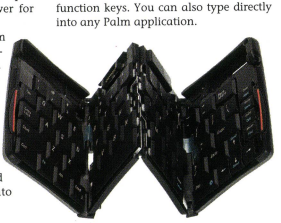
**Contact** Lego
**Phone** (02) 9428 9666
**Online** www.lego.com
**Price** $190

## Palm Portable Keyboard

If you are a real gadget fan, carrying a notebook PC is probably not cool enough for you. A Palm equipped with a collapsible keyboard could be your answer for working on the move.

This little beauty turns any Palm device into a fully touch type-enabled alphanumeric terminal. The designers have taken a standard keyboard, split it into quarters and cleverly hinged it so it fits into a Palm-sized pouch. Setting up for any Palm is easy: open the hinges, slip the outer quarters inwards to lock the keyboard flat, then fold up the tiny stand and slide your Palm's HotSync port onto a connector strip.

The Palm supplies the power. All the controls — plus the usual hot-button selections — can be accessed through the function keys. You can also type directly into any Palm application.



Typing speed is excellent, and there's no sign of the lag you find with some add-on keyboards. The quality is also impressive. The only niggle is that you need a flat surface to use the keyboard on, otherwise it bends in the middle. Apart from this, the keyboard makes your Palm the perfect notebook replacement.

**Pros** Simple, effective, small
**Cons** No euro symbol

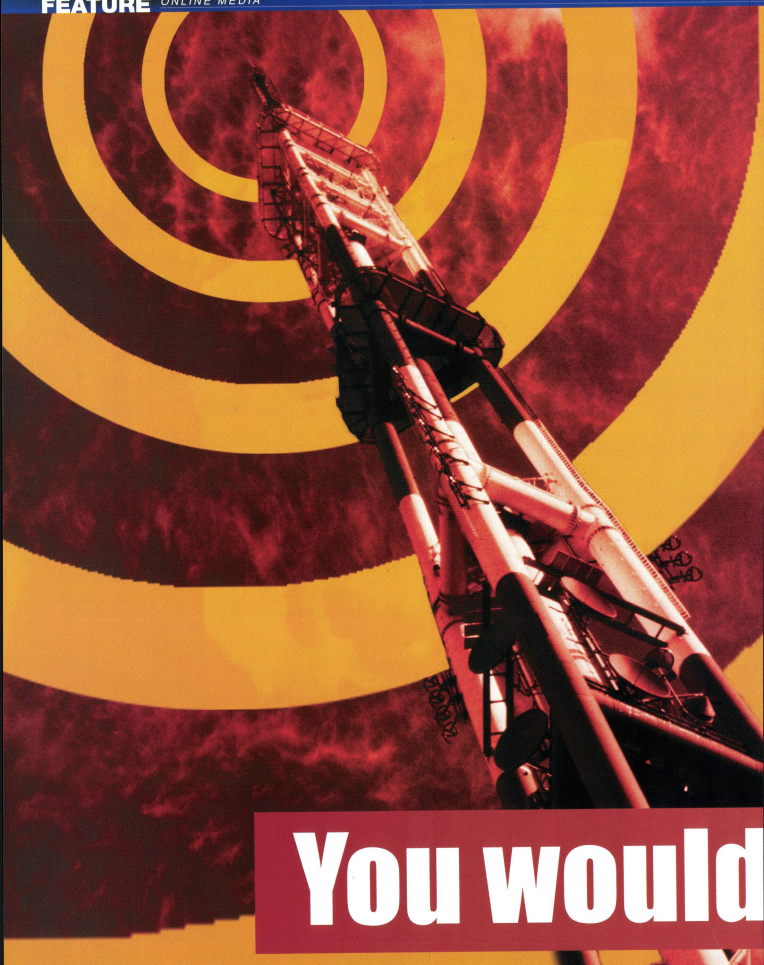
**Contact** Palm
**Phone** 1300 360 558
**Online** www.palm.com.au
**Price** $209

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# You would

*Despite early enthusiasm, media companies are struggling to find ways to make the Internet pay. Is this a short-term problem?* ***Jeremy White*** *canvasses the approaches old media companies are taking to going online, and looks into the future of Net publishing.*

The popularisation of the Web between 1994 and 1996 was characterised by one phrase: content is king. Journalists, analysts, pundits and gurus all subscribed to this concept. It captured the mix of excitement, possibility and explosive growth that the Web seemed to offer, not just to media organisations, but to anyone who wanted to be in the media.

## The promise

To publishers turning out newspapers, books and magazines, the Web seemed likely to revolutionise the publishing process, putting the media at the centre of a new order of universal access to information, and removing the cost in time and money of producing and distributing media products.

Even more importantly, the Web looked set to put the media at the centre of the new online world — they could extend their operations from selling information and advertising, and position themselves at the heart of a commercial universe, one in which media mastheads would become conduits for online commerce. If content was to be king, then the media would own the kingdom along with the commercial revenue it generated.

Media companies could use the credibility they'd built up with readers to take their audiences online. Once they'd moved online, their new access to these audiences could be used to support new commercial ventures such as the provision of goods and services. Rather than just writing about products, services and the economy, media companies could become the hub around which commerce takes place.

By going online, media companies could avoid the heavy costs of conventional publishing and broadcasting. The expense of having to physically print and distribute newspapers, books and magazines would be overcome, and the equally prohibitive cost of building networks of TV stations or rolling out expensive cable TV networks would also be unnecessary.

The Web also reasserted the primacy of text. After a century of increasing competition from more dynamic media forms that were driven by sound and then imagery — initially radio and then TV— here was a revolution in media that relied on words and documents. The Web is largely a text-driven medium with some still images and a small amount of video, audio and interactivity. Who better to dominate this textual world than the print publishers whose stock in trade was words?

At the same time, the Web promised to remove the barriers that had kept media markets semi-monopolistic for decades, and offered enormous promise for those wanting to establish new media enterprises.

The barriers to establishing media businesses had always been prohibitive. The cost of printing presses and of the physical infrastructure required to support print industries is daunting, as is the cost of transport. Establishing economically viable distribution for new publications is also very hard, especially as newsagents and bookshop distribution chains operate on a quasi-closed shop arrangement worldwide.

However, with the advent of the Web, the barriers that for centuries had separate writers, artists, reporters and pundits from their audiences looked set to come down. The Web would allow anyone with a PC and a modem to become a publisher, or so the argument went. Freedom of the press was no longer going to be limited to those who owned one; instead, the media would become democratised.

In short, the removal of many of the costs related to publishing and broadcasting, such as licensing fees, printing presses and broadcast towers, would not only benefit existing media proprietors, but aspiring new publishers as well.

For old players and new, the Internet promised a universal digital infrastructure where all forms of content would be reduced to a common base stream of ones and zeroes. Instead of having to spend money on their own infrastructure and distribution, everyone could take advantage of this new universal platform. They could spend their money on the preparation and presentation of content and services, and on placing media companies at the centre of a new ecommercial universe.

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## So what went wrong?

After more than five years of widespread use, the Web's early promise of a media revolution looks distinctly compromised.

Instead of hosting a diversity of new businesses, the online environment is more or less dominated by the same players that dominate the media offline. Instead of offering radical reductions in unit production and distribution costs, the Web has become a whole new moneysink, sucking up revenue, damaging offline circulation, disappointing advertisers, and showing little promise of return on investments anytime soon. As a result, new media often looks and feels very much like the old media, repurposed and served cold as an overhead.

## Approaches tried to date

Three broad approaches have been popular with businesses trying to build an online media presence. The first is where a company establishes a new subsidiary or separate operating division focused on Internet activities.

The second approach is the 'overhead' operation, where a small inhouse team works as part of an existing parent organisation. The final approach is the creation of new 'online only' media companies or products which are entirely focused on Internet operations.

All three approaches have their advantages and disadvantages, but all are short-term solutions. Long-term models for putting the media and other businesses facing the same challenges online must also evolve.

## New Internet operating divisions

Spin-off Internet subsidiaries or operations offer several advantages to well-established or larger companies. First, they overcome institutional inertia and bureaucracy. Instead of needing to gear all operations towards Internet operations (a difficult and expensive operation), a company can set up a smaller, more focused division to concentrate solely on Internet work. This division is able to move on so-called Internet time, reacting quickly without being dragged down or held back up by the rest of the company.

Second, Spin-off Internet subsidiaries can also be used to 'unlock' the potential value of the company's Internet operations on the public markets. This can be done in several ways. The division can be set up and floated as a new company. This was the approach taken by PBL (Publishing & Broadcasting Ltd) with the float of ecorp, where 20% of the company was sold to the public. The main asset of this venture is ninemsn, a joint-venture between ecorp and Microsoft. With strong financial backing from its parent companies and the public markets, traffic from Microsoft's Internet Explorer and MSN, and the promotional power of ACP's (Australian Consolidated Press's) magazines and Channel Nine, ninemsn has been able to achieve significant levels of online traffic and usage. This is a classic example of the 'unlock the value' model: it delivered a financial windfall to its parent companies through a float, and unlocked resources to build a successful online property. This has occurred despite the decline in ecorp's market value




following the stock market correction in April 2000.

The *New York Times* and several other US old media publishers also considered this approach. Almost all run their Internet operations as separate divisions. Several have proved successful in their own right. For example, the *Wall Street Journal* has established a successful subscription-based model for its online content, and the *Chicago Tribune* has used its online operations as a research and development experiment for how they can evolve and develop successful cross-media businesses in the future.

The drawback with this approach is that it risks leaving the company's other divisions behind. A common complaint among journalists in the traditional divisions of Australia's major daily newspapers is the lack of technology resources and even Internet access.

A new division or operating subsidiary does not necessarily need to be floated to achieve its objective. For example, Fairfax established f2 in Australia as a separate online operation distinct from the company's individual newspaper operations. Despite suggestions from Fred Hilmer that f2 may be floated following the ecorp float, the company decided against it.

A 'tracking stock' can also be established for online operations. This allows the value and performance of the Internet division to be tracked within an existing public company. This approach was taken by US technology publisher Ziff-Davis before it was bought out by CNet. Despite well-established revenue, a good track record in print, and more traffic online, Ziff-Davis saw its entire operations valued at less than a third of its online-only rival. In an attempt to free its online operations from the perceived dowdiness of its old-world print business, Ziff-Davis broke out ZDNet.

## Overhead operations

Another approach has been to enter into joint ventures or mergers with online or technology-focused players. The merger of the biggest online services company in the US, AOL, with the massive old-media Time-Warner company is a good example of this. Time-Warner spent five years sinking capital into what it described as its 'black hole': a pioneering Internet venture called Pathfinder which attracted little traffic and brand recognition. Instead of going to the Pathfinder site or network, most users went straight to their favourite brands (such as *Fortune* or *Entertainment Weekly*).

Establishing an inhouse overhead operation within an existing media company also has advantages. Setting up a small inhouse team allows a company to develop competencies online and build skills and knowledge within its existing operations. If the inhouse group proves successful, the company always has the option of expanding it or restructuring it as a separate division. This approach is similar to that taken by *APC* when it prepared to go on the Web in 1994 and 1995. As part of the magazine's operations, a couple of staff worked on the Web site.

This is by far the most common way for smaller magazine or newspaper publishers to make the move online. With this approach, one or two interested staff are made responsible for a basic site, which usually grows, expands and draws in other staff members over time. There are three main problems with this approach: it relies on interested individuals; it's difficult to execute in a strategic manner; and it tends to be held back by the overall level of online commitment by the media company.

Many publishers do go online this way, but some smaller publishing houses have

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avoided the losses sustained by others by not going online at all yet.

## Internet only

The Internet-only media company has proved an incredibly difficult proposition. Since the market correction last April, 'pure content plays' as they've come to be known, have been hammered. Even the biggest and most successful online media companies have seen their market capitalisations dwindle to fractions of their highest stock prices.

Yahoo has followed an advertising-driven model, has a strong lead in traffic levels, and makes a modest profit. Arguably the most successful Net content play ever, Yahoo saw its share price plummet from more than US$250 to between US$35 and US$40.

Some of the most successful and high profile online media services, such as financial news service TheStreet.com, and political magazine Salon.com, are facing extinction, and staff reductions and periodic business model changes are almost an industry constant. TheStreet abandoned charging subscriptions for a bulk of its services.

Even Internet-only titles with quite modest expectations have faced a difficult climate in Australia. For example, Media Flash — an email and Web media industry news service — was forced to issue an impassioned plea for financial help to its 6,000 subscribers after founder and owner Ash Long accumulated debts of $85,000. The free service has since started offering the equivalent of 'shareware' media. Users receive the basic newsletter for free and can pay to receive an extended version called Media Flash Confidential.

A more formal Australian online-only media product, the Zeitgeist Gazette, also faced problems. Ex-ACP head Richard Walsh and ex-*Media Watch* executive producer David Slater closed their upmarket Internet-based media and cultural publication shortly before the technology market crash. They realised that even substantial subscription fees wouldn't provide a sustainable short-term revenue stream.

At the consumer end of the market, recent closures have included BigFatRadio, an online radio venture that folded after only four months, and youth online network KGrind.



## Where to from here?

Many of the principles the media has utilised over the last six or seven years dealing with the new online world are commonsense. However, the Internet has shown that accepted wisdom is not always enough.

The Internet really does revolutionise the distribution of information, analysis, resources and entertainment to its audiences. It gives people more control over what they read, see and hear, and will decimate many existing media franchises over the next 20 years. As Lotus's chief technologist Nick Shelness observed, "A clear view does not equal a short distance."

It is clear that the print media is under a serious long-term threat. Anecdotal evidence suggests that we are in an early phase of long-term systemic print circulation declines for newspapers, and the magazine market has only sustained growth through significant fractionalisation.

Put bluntly, newspapers deliver yesterday's news. They chew up valuable physical resources, and their distribution is a relatively slow and expensive process compared to online delivery.

Similarly, magazines can be months out of date, and between 25% and 50% (or more) of each print run is pulped. Books have a wonderful feel and are an incredibly portable and pleasurable reading format, but compared to online publishing, they are unjustifiably expensive and difficult to distribute.

As display technologies improve, and reading devices become lighter and more portable, print publishing will begin to find it difficult to compete. In other words, as the technology improves, the benefits of print will recede.

Anyone who has listened to online music or watched Net video over broadband sees a similar long-term future for video content. The way media is delivered will definitely change. The question is when, not if.

Is this all likely to happen next year? Of course not. In five years or 10 years? Probably not. But if you read an ebook now using a Glasshouse or Microsoft reader, or listen to a New York radio station over the Net, you very quickly see where the world is moving. In 20 years time, it's likely that the reading, viewing and delivery tools of choice will be electronic.

The experiments that are proving so painful now are just that — experiments. We're living in the research and development phase of a new way to consume the media, and if media companies have found the experiments expensive, they have yet to feel the impact of the real thing. ■

*APC is owned by PBL, which also owns the Nine Network. ninemsn is jointly owned by Microsoft and PBL.*

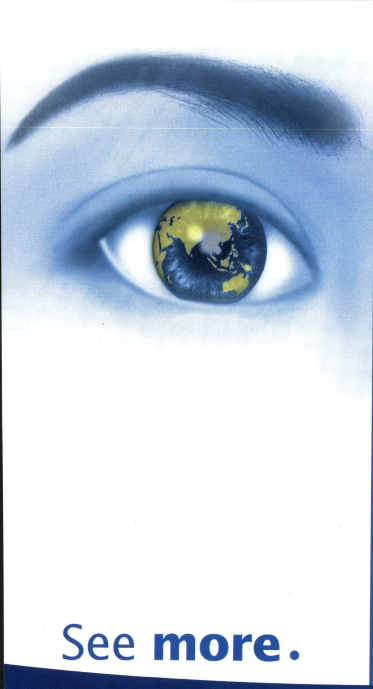
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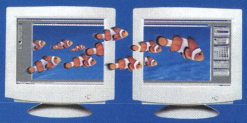
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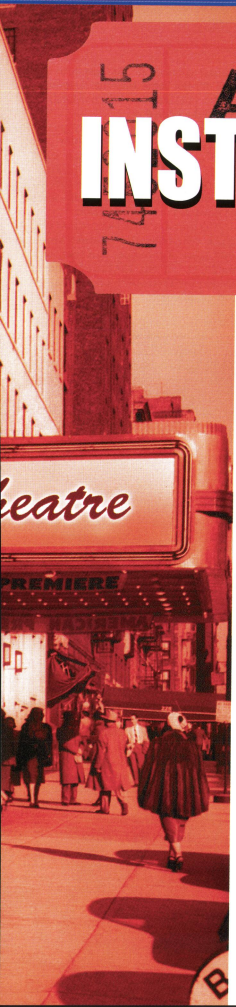
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Home




*If you have a good TV at home, you might be thinking about buying a DVD player. However, if you plan to use your TV for audio, you'll miss out on one of the best features of DVD movies.* ***Darren Ellis*** *reviews the DVD home theatre systems that can transform your dreary lounge into a fantastic cinema setup.*

It's important to think about exactly what you want from a home DVD player. Some older movies and most new releases are coming out with impressive surround-sound effects. Hooking a DVD player up to your current stereo gives great audio, but you're really cheating yourself out of some great movie watching experiences.

A DVD home theatre system gives you a new stereo as well as DVD-playing functions. All-in-one home theatre systems also have built-in integration between the player and speaker components. All of the systems reviewed here feature AM/FM tuners and you can hook your current VCR (or other components) into them.

Most of the players *APC* reviewed are very new, but already there is talk on the Internet about modifying or circumventing regional limitations. One of the models we reviewed plays both region 1 and 4 discs, but the rest were set to region 4. It's not illegal to modify equipment you have purchased if you don't charge for your work, but you will void any warranties if you open the case.

With all DVD home theatre systems, it's important to get the speakers and audio configured properly. Each DVD has different audio capabilities; older movies converted to the DVD format usually have two-channel stereo, but most new discs feature Dolby Digital, Dolby Surround or DTS sound formats.

PAL DVDs *must* have PCM (two channel) or one of the following sound formats: Dolby Digital, MPEG-1 layer 2 (two channel) or MPEG-2 layer 2 (multichannel). The following formats can also be used alongside those above: PCM, SDDS, Dolby Digital, DTS and MPEG. Almost all DVDs and DVD players have Dolby Digital soundtracks and decoders, including mono, two channel or 5.1 channel audio. An upcoming sound format, DTS (Digital Theatre Systems), gives richer sound, but it is a larger file which takes up more room on the disc. Many DVDs come with alternative soundtracks — sometimes as many as five — but space constraints mean not all can be in DTS format. Usually the main soundtrack is DTS and the rest are Dolby Digital 5.1.

All of the systems *APC* reviewed are Dolby Digital 5.1 capable (5.1 audio refers to the five speakers — front left, front right, rear left, rear right and centre — along with a subwoofer), but only the Sony Dreamsystem DAVS300 and the Pioneer Vision+ 2001 were submitted for review with subwoofers.

# Philips FW-D5



Like the Teac DV-D990, the Philips FW-D5 is an all-in-one package that includes DVD, CD, VCD and AM/FM tuner functions. However, the Philips unit is a much better product.

The Philips FW-D5 comes with a three-CD carousel and an individual DVD tray, so DVD and CD functions are kept separate. The unit has two jog dials on the front, one for DVD and the other for audio. The DVD jog dial allows you to navigate through DVD menu screens manually. The audio jog is more complex and is used in conjunction with the four sound control buttons, which you can set to preprogrammed equaliser settings. These include virtual environment control (hall, concert, arcade and so on), digital sound control (such as classic, techno, rock), dynamic bass boost (beat, punch, blast) or one of six personal settings.

The system is easy to set up and get running as the rear of the unit is well labelled and easy to work out. The speakers have long cables which give you flexibility for good placement in big rooms. The sound quality is excellent, provided you select the correct sound setting. Some fiddling with the audio jog was required at times when watching DVDs; it wasn't always easy to give the audio the right amount of surround, plus a strong enough centre channel. The FW-D5 has a Dolby Digital AC3 5.1 decoder that is lacking in some home theatre systems.

There are two video outputs — Y/C S-Video out and CBVS video out. Other output connections include audio out, line out and surround out for optional wireless surround speaker connection. The system tested by *APC* did not come with the optional subwoofer, but there is a connection for it on the rear of the main unit.

The onscreen display is very good and easy to navigate, and the display on the front of the unit is bright and easy to read. Overall DVD video quality is superb, with very crisp and clear colours. The video-out port is satisfactory, but not as good as the Y/C connection.

The unit *APC* tested was region free. A quick search on the Internet revealed that most of the other players could be modified, but this was the only one that could play DVDs from any region without modification.

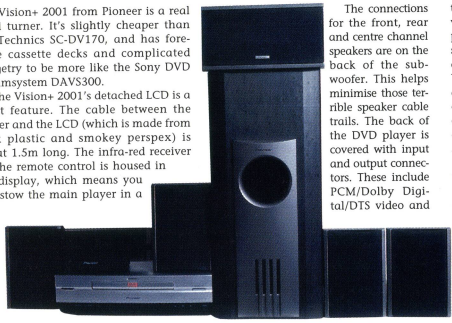
**Pros** Good surround audio
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**Cons** Audio can be fiddly to set up

**Contact** Philips
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**Online** www.philips.com.au
**Price** $1,449

# Pioneer Vision+ 2001

The Vision+ 2001 from Pioneer is a real head turner. It's slightly cheaper than the Technics SC-DV170, and has foregone cassette decks and complicated gadgetry to be more like the Sony DVD Dreamsystem DAVS300.

The Vision+ 2001's detached LCD is a great feature. The cable between the player and the LCD (which is made from dark plastic and smokey perspex) is about 1.5m long. The infra-red receiver for the remote control is housed in the display, which means you can stow the main player in a cabinet and just have the minimalist LCD on show. The front of the player has only a few basic controls such as play, forward and eject, so the unit is mainly controlled by the remote.



The connections for the front, rear and centre channel speakers are on the back of the subwoofer. This helps minimise those terrible speaker cable trails. The back of the DVD player is covered with input and output connectors. These include PCM/Dolby Digital/DTS video and optical in ports, optical audio-out, two Y/C video-out ports, two Y/C video inputs and the usual analog audio inputs and outputs.

The Vision+ 2001 can play DVDs, VCDs and CDs, and comes with a built-in AM/FM tuner. When *APC* loaded DVDs of different vintages (DTS, 5.1 and Dolby Digital) the player automatically determined which sound format was best and set the audio accordingly. In contrast, the Philips and Teac players require manual setting of the audio for each DVD. The surround sound on the unit is excellent and by far the best of the five players tested. This was a pleasant surprise considering how small the speakers are. The subwoofer was especially effective, and made a big difference to our viewing experience.

The picture was clear and crisp, but darker than the other displays. However, after changing the display setting to Animation (the other two settings are Cinema and Standard) the display brightened.

**Pros** Very stylish design
Excellent audio
**Cons** Rather expensive

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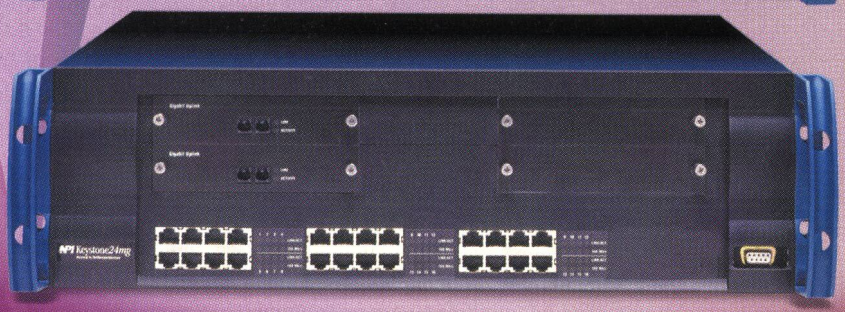
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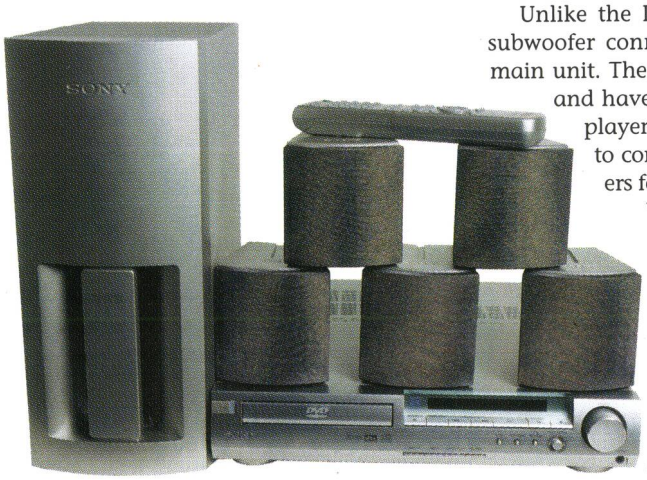
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# Sony Dreamsystem DAVS300




This system has a lot in common with the Pioneer Vision+ 2001. Both have small players with a single disc tray, and both include subwoofers. The Dreamsystem can play DVDs, CDs and VCDs, and it also comes with a built-in AM/FM tuner. Apart from the Pioneer Vision+ 2001, it's the only player *APC* reviewed that has a built-in DTS decoder, and it also comes with Dolby Digital and Dolby Pro Logic decoders.

Unlike the Pioneer, the speakers and subwoofer connect into the back of the main unit. The cables are extremely long and have colour-coded plugs at the player end, which makes it easier to connect and place the speakers for optimum performance.

When *APC* tried to test DVDs, the player didn't always select the correct sound setting, but it is easy to do this manually. It also doesn't automatically switch aspect ratios to suit different DVDs. The LCD on the player is extremely bright and easy to read, but doesn't carry enough information about player activity. The same can be said for the onscreen display, which offers fairly basic options for configuring the player.

The speakers are even smaller than those that come with the Pioneer unit, but they produce crystal clear sound. You can configure the speaker spacing, including the rear speaker height. Setting up the speakers was complicated and time consuming, but well worth the effort. Once set up, the player is excellent.

The Dreamsystem produced by far the clearest image of all players tested (perhaps not surprising considering the test TV was also a Sony product), and the standard setting 5.1 surround sound audio was also superb. The other surround settings, including a few virtual surround presets, were quite effective.

The back of the unit has video and audio outputs for a VCR, and two inputs for the same VCR and an extra unit. It also includes a woofer out, a VCBS video out and an S-Video port for connecting to a TV.

The Sony Dreamsystem DAVS300 is a good performer and is very reasonably priced. It's selling quickly and is quite hard to find in the shops.

**Pros** Great sound and picture quality
**Cons** Requires some fiddling

**Contact** Sony
**Phone** 1800 226 429
**Online** www.sony.com.au
**Price** $1,599

# Teac DV-D990




Teac's DV-D990 home theatre system is the cheapest of the units sent in for this review, and it shows. It's extremely light and flimsy, and the construction gives the impression that it's not as high quality as the other models.

Setting up the system was simple. The cables are not colour-coded, but it was obvious what went where as the left and right speakers have bare wire connections and the rear and centre speakers use RCA connectors. The two main speakers have a stylish wood-grain finish, but it doesn't match the main unit. The rear and centre speakers are sloped back at an angle, which is great for directing sound into the room from the floor or from a wall-mounted position.

The back of the unit is almost bare of inputs and outputs. The player is limited to basic auxiliary input, CVBS video out and optical digital audio out. It has Dolby Digital Pro Logic audio, but no AC3 decoders. The audio is passable, but not good for playing DVDs at high volume. In fact, CD audio was clearer.

The video quality was a little disappointing and seemed to suffer from some internal interference. However, this was not as noticeable as it sounds, and only became obvious when *APC* compared the picture to the other systems.

The best feature of the DV-D990 is the CD carousel. Unlike the Philips FW-D5, it can hold three DVDs, CDs or VCDs without a separate tray. When playing a VCD or CD, you can simultaneously display track and disk information on the television. The player also comes with twin cassette decks and an AM/FM tuner.

The onscreen setup menu is easy to navigate, but you can also use the jog dial on the front of the player. The player's LCD is reasonably dim and doesn't carry a great deal of information.

At $749, the DV-D990 is a decent option for budget-conscious shoppers who want an affordable instant home theatre. However, if you spend a little more, you'll get a much better system.

**Pros** Budget price
Lots of functionality
**Cons** Video not as clean or crisp as others

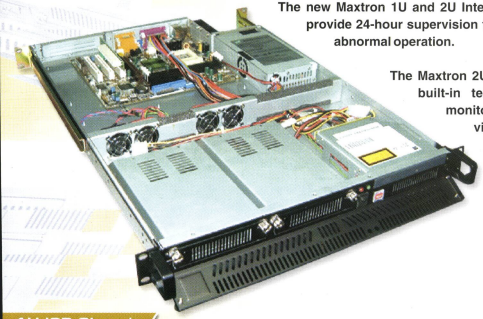
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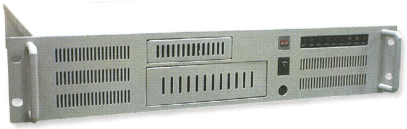


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# Technics SC-DV170



The Technics SC-DV170 is a complex home theatre system with four separate components that can be stacked in two ways: as two pairs side by side, or in a stack of four. The connecting cables between each unit aren't long enough to allow for other configurations.

There's a CD/DVD changer, a dual cassette deck, an AM/FM tuner/amplifier and a sound processor. The CD changer can hold up to five discs, but can only eject or load one disc at a time. Loading and ejecting discs takes longer than in the other models reviewed because the motors have to sort through the trays. The SC-DV170 can play DVDs, VCDs and CDs.

This player doesn't have a DTS decoder, but it does have some advanced surround sound settings including Dolby Digital 5.1, Dolby Pro Logic, super surround (which adds surround effects to stereo recordings) and simulated stereo (for mono audio). There are other audio settings that can be toggled from a row of buttons on the sound processor when you are listening to surround sound. These include centre focus, virtual rear sound, multi-rear sound and 3D-enhanced sound, all of which have a dramatic effect on audio playback quality.

The display on the unit provides a 3D representation of the room, including the position of all speakers as well as the listener. Using the multi jog dial, this can be configured for different listening modes. The two main speakers have three cables which connect to the main unit for low, medium and high frequencies. The levels for these can be adjusted further .

The SC-DV170's Dolby Digital 5.1 surround sound audio is excellent. All speakers were crisp and clear, and the surround aspects were great, particularly with multi-rear surround switched on (this provided more depth). The image quality was also very good. The onscreen display is laid out like a tabbed window in a Windows program, which makes it easy to navigate with the remote.

The player has numerous inputs and outputs including video in and out (for VCR), auxiliary audio input, VCR audio input and output, video out and S-Video out. The Technics SC-DV170 has an enormous range of features that cover most uses, but it is at least $500 more expensive than any other home theatre system *APC* reviewed.

**Pros** Good sound and audio functions
**Cons** Expensive

**Contact** Panasonic
**Phone** 13 26 00
**Online** www.panasonic.com.au
**Price** $2,299

EDITOR'S CHOICE
Australian Personal Computer

## Pioneer Vision+ 2001

**Highly commended**

Sony Dreamsystem DAVS300

Some very good systems were submitted for review, but the Pioneer Vision+ 2001 was definitely the best. It looks stylish, takes up very little room and has lots of functions and features. It's very similar to the Sony Dreamsystem DAVS300, which was also a standout product, but the Vision+ 2001 has that little bit extra.

Both systems feature high-quality audio, including Dolby Digital 5.1 and DTS, and both have great subwoofers.

Of all the systems reviewed, these two are the best for transforming your lounge room into a theatre.



## How we tested

*APC* found the best way to test the DVD home theatre systems was to set them all up, configure the audio to get the best surround sound possible, configure the display to get the best picture quality possible, and then sit back and watch some DVDs and VCDs, and listen to some audio CDs.

We used DVDs that showcase old and new movie transfers. Old movie transfers allowed us to judge the system's ability to display video transferred from older film that isn't as clear as new stock, and to play less than perfect audio (stereo for instance). Newer DVDs were used to check for video clarity on transferred video that hadn't aged, and for the quality of 5.1 Dolby digital surround.

*APC* also paid attention to extra functions and features. We compared features such as cassette decks and AM/FM tuners, and tested how easy remote controls and the controls present on the units are to use. *APC* also noted how easy it is to set the systems up, and since they're going to become a major feature of our lounge rooms, looks were also considered.

Movies watched on each system (regionality allowing) included *Fight Club* (US NTSC version), *The Hudsucker Proxy* (US NTSC version), *L.A. Confidential* (PAL), *Toy Story 2* (PAL), *Aliens* (PAL), *The Big Lebowski* (PAL), *Contact* (PAL) and *The Matrix* (PAL). Obviously, we didn't watch each movie in it's entirety, but chose scenes that effectively showcase audio, video and surround sound effects.

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# In the line of fire

*Games controllers can be fun when they work, and agonising when they don't.* ***Alex Kidman*** *reviews a whopping 17 games controllers, sorting the sniper-shooting aces from the suction-cup shooting suckers.*

It's been a year since *APC* comprehensively reviewed games controllers, and a few things have changed since then. The most obvious development is the uptake of USB. Last year, it was treated as an extra, but this time around, all but a few of the controllers we looked at support USB, and quite a few are USB only. The influence of consoles on gamepads is still very noticeable; most of the gamepads we examined were at least partly inspired by the basic Sony PlayStation controller design.

Game controllers usually fall into roughly four categories: joysticks, wheels, console-style gamepads and light-guns. However, recently a new type has emerged: a big hunk of plastic with programmable buttons (see 'The art of war', page 98).

Your choice of controller will depend on two basic things. First, what kind of games do you play? If you only play flight simulators, most gamepads will be worse than useless. If sports games are your thing, joysticks are generally not as good as gamepads, and only a masochist would even attempt to play RTS games with a wheel. The second factor is purely ergonomic and relates to hand size. If you've got huge hands, a tiny gamepad will get crunched, and if you have small hands, a huge joystick may be uncomfortable or difficult to control.

It's also important to look at other ergonomic factors, especially the button layout and type. Sharp, clicky buttons may seem neat, but they put greater stress on your thumb. Game warnings tell people to take a 10-minute break every hour, but the reality is that many people who play games tend to play too much and for too long. If you are going to do that, you may as well be comfortable while you acquire RSI.

Secondary functions are also a big consideration. If you only play Space Invaders, one fire button is fine. If you play complex games with lots of vital functions, extra buttons, throttles and hat switches are necessary. Make sure that your controller has features you'll actually use, not ones you'll look at once and then ignore. For example, if none of your games have force feedback, you'll be wasting your money because the only time you'll be able to use it is at calibration.

The technology for games controllers moves quite slowly. Any of the controllers *APC* recommended last year still compare well against this year's crop. One of the controllers we reviewed last year (the Microsoft Sidewinder Game Pad Pro) was resubmitted this time around and won Editor's Choice in its category. Gravis did well last year, but failed to submit controllers in time for review this year.

## Win!

Thanks to Microsoft, *APC* has three prize packs, each valued at $188, to give away. Each prize pack contains a SidewinderPrecision 2 joystick (reviewed on page 94) and a copy of Crimson Skies (reviewed in *APC* December, page 194). To enter, go to apcmag.com/comps and follow the link.



## Logic 3 PC Avenger

The PC Avenger is the only stick in the Logic 3 range with its own drivers. Like some of the higher-priced pads, it has analog and digital controls. Both were poor. The analog was loose and required constant recalibration, and the digital was loose and clicky. The button layout is especially poor. Button 1 is the left shoulder button, which is much too inconvenient for most games. Better alternatives exist at this price.



**Price** $79

## Logic 3 Phantom 2

The Phantom 2 joystick looks good and offers reasonable game control for the price. Like a lot of the Logic 3 range, there are no specific drivers, so it's defined as a generic joystick in the control panel. We had trouble getting the Phantom 2 to work with Grand Theft Auto; it refused to recognise the stick at all. If you can live with that (a patch seems unlikely), the Phantom 2 is a good, if unremarkable, joystick.



**Price** $99

## Logic 3 PC TopDrive

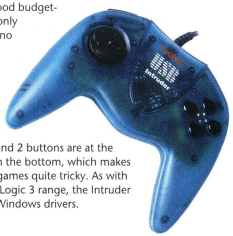
The TopDrive is quite a nice wheel, but it's not spectacular. It has one major flaw, unless you're unusually short: the cable between the wheel and the pedals is far too short. When we set it up on the testing bench, the pedals just made it to the floor, which made for a very tortuous driving experience. The wheel is rather loose in the centre, but it's still very responsive. The pedals tell the same story.



**Price** $129

## Logic 3 USB Intruder

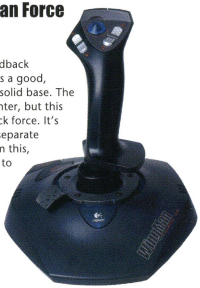
Despite its silly name, the USB Intruder is a good budget-priced pad. It only supports USB; no analog, no feedback, no tilting. The Intruder's only important failing is its odd button layout. The 1 and 2 buttons are at the top rather than the bottom, which makes playing some games quite tricky. As with the rest of the Logic 3 range, the Intruder runs off basic Windows drivers.



**Price** $39

## Logitech Wingman Force Feedback

This is the only force feedback joystick in our review. It's a good, powerful joystick with a solid base. The stick could be a little tighter, but this might lessen the feedback force. It's USB, but still requires a separate power source. Aside from this, the layout is very similar to other Logitech joysticks. As with the Rumble Pad, the rudder is a weakness. It's loose, but a much better size.



**Price** $139

## Logitech Wingman Formula Force GP

This Logitech wheel was last year's Editor's Choice and it was a great wheel. It's since dropped in price, which is great. The compromise? The quality has plummeted. The wheel is smaller, lighter and much noisier. The force effects are less convincing, feeling more like random shudders than feedback. If you can get one of the old ones, snap it up, as they're excellent. Otherwise, avoid the Formula Force GP.



**Price** $229

## Logitech Wingman Rumble Pad

The basic idea behind the Wingman Rumble Pad is a good one, but the layout certainly needs some work. The main problem is the size of the game buttons. They are far too small to be used comfortably by average-sized hands. The rudder is also small, and is loose and a bit flimsy. The rumble feature works very well. It's not quite as strong as the Firestorm, but oddly enough, it's much better than the Logitech Force Feedback wheel.



**Price** $79

## Microsoft Sidewinder Game Pad Pro

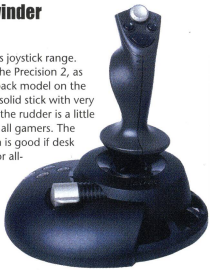
Last time we looked at controllers, the Game Pad Pro blitzed the field. Other controllers have improved, but this one has remained much the same and still rates as excellent. It doesn't vibrate, but it has a great analog/digital all-in-one direction pad, and feels comfortable across a range of hand sizes. Response is good in either mode, which isn't always the case for controllers with multiple directional controls.



**Price** $59

## Microsoft Sidewinder Precision 2

Microsoft is revamping its joystick range. There's a new model of the Precision 2, as well as a new force feedback model on the way. The Precision 2 is a solid stick with very well-placed buttons, but the rudder is a little loose and it may not suit all gamers. The base is quite small, which is good if desk space is at a premium. For all-round gaming, the Precision 2 is a good choice.



**Price** $89

## Microsoft Sidewinder Precision Racing Wheel

Like its joystick counterpart, the Precision Racing Wheel isn't the fanciest on the block and doesn't have the most doodads, but it gets the job done. The Precision wheel is a little loose at the centre, but once it was calibrated it responded better than the equivalent Logic 3 wheel. It also had the best desk clamps we saw. They are simple and easy to connect.



**Price** $109

## Saitek Cyborg 3D USB

If you're the type who likes to tinker with your hardware, the Saitek Cyborg is the joystick for you. Literally every aspect of the controller, from tension to handrest spacing, can be adjusted with an allen key. Just make sure you don't lose the screws. After some adjustment, you'll find the Cyborg is a very comfortable stick with excellent response. However, it may not be very convenient if several people regularly use the same stick.



**Price** $149.95

## Saitek P2000 Tilt Pad

The P2000 is a good basic gamepad. The digital and analog pads respond well, but the digital pad is a little sharp on the edges. The P2000 has a tilt function, which allows you to control games by tilting the pad. This can be fun, but after a while it becomes tiring as you have to hold it quite level. However, it is well suited to games such as Motocross Madness 1 and 2.




**Price** $99.50

## Saitek SP550



The SP550 joystick and gamepad combo sounds like a good idea. When using the stick, the gamepad becomes extra buttons and a hat switch. However, the execution leaves a little to be desired. The gamepad response was poor, as was the joystick, and switching between the two involves removing and re-adding through the control panel, which could have been avoided had the whole thing been USB. Nice idea, but it doesn't work.

**Price** $99

## Saitek X36F

The X36F came very close to being the Editor's Choice for joysticks. It has plenty of buttons and hat switches, a solid base and a separate throttle. The only flaw is that the throttle feels loose; it's difficult to use unless you've got reasonably large hands. At just under $300, the X36F is expensive, but it is still the best flight simulator-style control we saw.

**Price** $299



## Thrustmaster Firestorm Dual Power Gamepad

The Firestorm gamepad is one of two vibrating gamepads we looked at. Of the two, it has better and stronger feedback. It's design is very similar to the basic PlayStation gamepad, but it has more buttons, which shouldn't be possible. Our only concern with the Firestorm was that it absolutely, positively wouldn't work with Frogger 2 in either analog or digital mode. If you don't mind this (or if a patch appears), the Firestorm is a mighty fine gamepad.

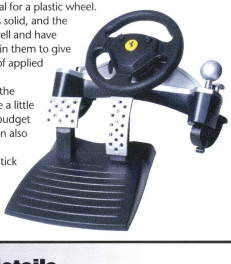
**Price** $79.95



## Thrustmaster 360 Modena Pro

The Modena Pro is modelled on a Ferrari wheel and it feels surprisingly natural for a plastic wheel. The rubber grip is solid, and the pedals respond well and have enough strength in them to give a good gradient of applied power. Our only complaint is that the attaching clips are a little fiddly. If you are budget conscious, you can also buy the Modena without the gearstick for $50 less.

**Price** $149



## Thrustmaster Top Gun Afterburner

Thrustmaster used to be a major name in joysticks. It's now owned by Guillemot, so let's hope that it continues to produce sticks as good as the Afterburner. The stick was comfortable for a range of hand sizes, responded well, and has good, logical button placement. The supplied throttle, which can be removed with an allen key, is particularly good.

**Price** $119



## Contact details

### Logic 3

**Contact** Logic 3
**Online** www.logic3.com
**Phone** (02) 9417 8333

### Logitech

**Contact** Logitech
**Online** www.logitech.com
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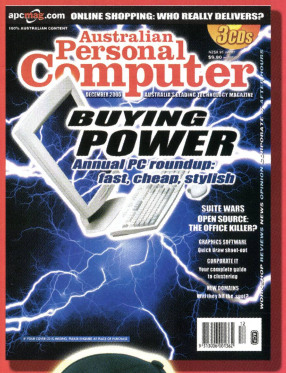
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## The art of war

Games controllers don't have to be joysticks or pads; they can be much stranger.

### Saitek GM2 Action Pad and Game Mouse



The Saitek GM2 is a pad and mouse combo pack which is primarily intended for use with first person shooters and other 3D titles. Using it can take a little getting used to, and it pays to spend some time tuning it to find your preferred configuration. It's possible to program more complex moves (such as rocket jumping in Quake, which requires you to look down, jump and then fire a rocket) to a single button.

The ergonomics need a little refinement. Using the pad with all its buttons means that your hand is quite spread out, and the mouse is rather large as well. Although the GM2 has quite a few buttons, many games need more. This means a lot of darting between pad and keyboard to achieve those extra moves. Overall, it's a great idea that's undermined by poor ergonomics and the need for a few more buttons.

**Price** $119.50

### Microsoft Sidewinder Strategic Commander



Microsoft's first product in the combined 'pad-controller-mouse' market is aimed almost exclusively at real time strategy gamers. Its six buttons can be configured as many as 12 times each, which gives you 72 possible commands. It performed well under games like StarCraft, but creating pre-assigned squads is still quicker with the keyboard. The Record button allows you to add controls (and complex sequences) as you play. This is one of the controller's best features, and it can be used with other types of games such as first person shooters.

However, the unit lacks some of the more specialised features seen on the GM2, such as the Hat and throttle wheel. This makes it best suited to RTS fanatics, but it is still useful for other games.

**Price** $99

***Daniel Gardiner***

EDITOR'S CHOICE
Australian Personal Computer

## Gamepads

### Microsoft Sidewinder Game Pad Pro



**Highly commended**

Thrustmaster Firestorm Dual Power Gamepad

The Game Pad Pro won last year and still can't be beaten for the price. However, the Firestorm is a serious challenger and would have taken the crown if it hadn't failed to register in Frogger 2.

## Joysticks

### Thrustmaster Top Gun Afterburner



**Highly commended**

Saitek Cyborg 3D USB

The Top Gun Afterburner is good for different game types, is sturdily constructed and has a great throttle. The Cyborg is the ultimate adjustable stick. Competition here was closer than in any other category, as the Precision 2 and X36F also performed well.

## Wheels

### Thrustmaster 360 Modena Pro



**Highly commended**

Microsoft Sidewinder Precision Racing Wheel

The Modena is a good wheel with solid control and a good set of pedals. The Precision Racing Wheel is similar, but a little looser in control.

## How we tested

*APC* tested all the games controllers with a variety of games from a range of genres.

**Frogger 2** and **Space Invaders** were used to test simple compass direction-style movement. A good controller should respond crisply to these basic directions, and always in the right direction. This is especially important for gamepads, where directional pads can often misinterpret directions.

**Crimson Skies** was used to test multiple direction movement and multiple button usage. It's more shoot 'em up than flight simulation, but also served as a useful test of joystick controls under those conditions.

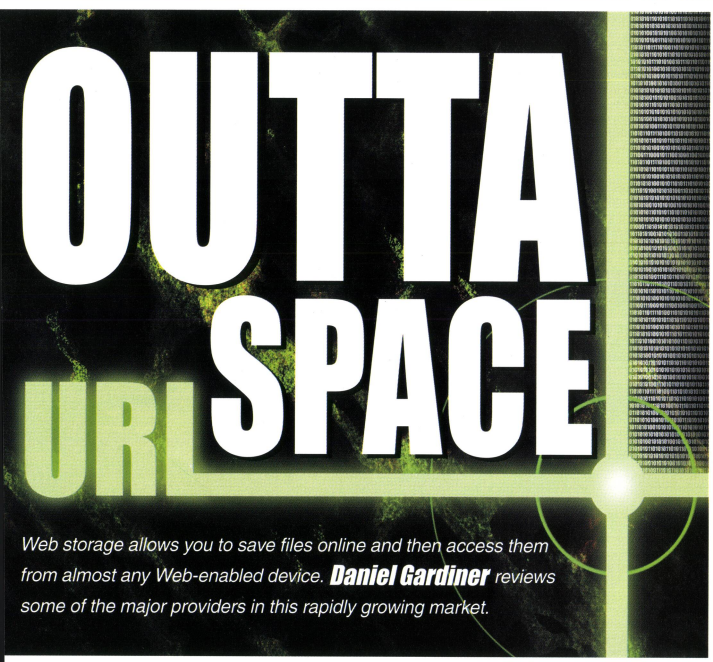
**Need For Speed 3: Hot Pursuit** was our driving game test environment. It supports force feedback and also tests gradients of left/right motion, especially rapid switching between the two directions. As with Crimson Skies, it allowed us to test rudder response and feel.

**Aliens Versus Predator** was used to test in an first person shooter environment. FPS games aren't very well suited to game controllers, but they are useful to test fine movements, and especially any minor variances between inputs and outputs, as even small movements should register.

**Grand Theft Auto** was run in DOS mode to test how well these controllers perform in a non-Windows environment. It's suited to gamepads and is a useful test for them as it has a rather unorthodox movement setup and requires multiple button usage.

Any built-in profiling/setup software was used where appropriate. Where games supported it, the most logical calibration and button setups were used. Initial settings may be poor in some games, but most players make adjustments for comfort.

All testing was done on a Compaq Presario with a 300MHz Pentium II processor, 96M of RAM and a 32M TNT2 graphics card, running Windows 98.



# OUTTA URL SPACE

*Web storage allows you to save files online and then access them from almost any Web-enabled device.* ***Daniel Gardiner*** *reviews some of the major providers in this rapidly growing market.*

The online world is full of companies claiming to deliver free services and products. We're constantly bombarded by offers of free mail, free money and even free porn. There's so much free stuff that there are now free sites to catalogue it all. As part of this trend, the last 12 months has seen the proliferation of free or trial online storage services that allow you to upload and store files on the Internet.

There are many reasons for the sudden popularity of these services, but the main one is that people are becoming more Web savvy and their needs are broadening. They want to retrieve files at different locations, enable sharing for Web communities or among friends, or safeguard the privacy and security of sensitive information.

These services all work on the same basic premise: if you sign up for an account, you are allocated a specified amount of free disk space (ranging from 5M to more than 300M) that you can use for storing files. The services operate like FTP servers (used specifically for storing, rather than viewing files on the Web) with an interface tailored to be comprehensible to lay people.

All services are basically the same, but each has strengths and weaknesses in areas such as interface design and ease of use, download and sharing options, and overall connection speed. Some provide Web clipping (the ability to enter a file's URL and have it remotely transferred to your online drive), and much more storage space than others.

Some sites have specific features, such as the ability to view saved images as thumbnails, or to capture Web pages to your online drive so that you can go back and view them without fear of them having been updated or changed. Others also offer a separate program (known as a shell plug-in) that incorporates your Web storage into Windows Explorer so you can access it as if it were just another hard drive.

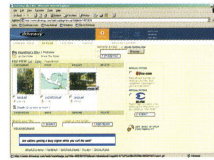
If you're looking for an online storage space provider, it's important to consider your overall needs. There are two questions you need to ask yourself: what is the space going to be used for, and are you willing to pay for guaranteed stability, security and extra features?

## Driveway

Driveway's shell plug-in, Drag & Drop, is one of the best. Like XDrive and MySpace, it adds a drive-like folder to Windows Explorer, but uses the Web Folders directory (already built into Windows), adopting its pre-existing standards. This means that you can double-click a file from your Driveway folder and it will attempt to open it in your default browser.

For Executables or Zips, there are two options: saving or opening them. Because Drag & Drop uses your browser to handle files, it is very easy to use.

A standard account comes with 25M of space, which can be upgraded in increments of 100M for a quarterly payment of $US29.95. A button added to the Links menu in your browser provides Web page saving. Remote saving is only available through ParkIt links that have to be created by a site designer. ParkIt links are rarely available on mainstream sites such as ZDNet.



**Pros** Good shell plug-in
**Cons** Limited remote saving ability

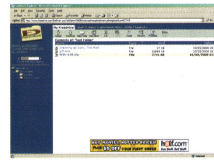
**Online** www.driveway.com
**Price** First 25M free, then $US29.95 per 100M per quarter

## Freedrive

Freedrive is a reasonably straightforward site, providing 50M of free space. You can buy more for a monthly fee that ranges from $US6 for 100M to $US40 for 1G. The interface works like a cross between a Web browser and Windows Explorer, which means that navigation and basic actions like cutting and pasting are very easy.

For file sharing, all parties need to have Freedrive accounts. Any folders you want to share are given as links, which can then be sent by email or posted on a Web page. To save remotely on Freedrive, you paste URLs into a pop-up window as you surf. You can also create photo albums, and view them or run a slideshow with the built-in viewer.

Freedrive has two main problems: little free space and very slow page loading.



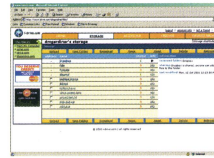
**Pros** Easy to use
Remote save from browser
**Cons** Only basic features

**Online** www.freedrive.com
**Price** First 50M free, then prices start from $US6 per month

## i-drive

This is one of the bigger services. It has plenty of affiliate sites such as ZDNet and Scour which allow you to 'sideload' files to your drive. This doesn't really save them, but links back to the original location. It provides 50M of storage on signup and has a browser plug-in called Filo that allows you to send URLs or images back to your account using the right-click menu.

Image files are handled very well; they seem to be uploaded at a phenomenal rate. You can create photo albums with thumbnails, and you can also stream MP3 files from the site with user-created playlists. A new feature is a standard shell plug-in, which works in the same way that Driveway's plug-in does; by adding a new drive to your desktop and to the Web Folders menu. It uses standard browser functions for the files stored inside the folders.



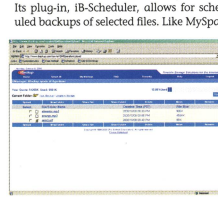
**Pros** Extensive plug-ins for browsers and Windows Explorer
**Cons** Interface could be much better

**Online** www.idrive.com
**Price** Free

## IBackup

This storage site is for those seeking a secure place to back up files. You can encrypt your uploads and downloads using SSL, and there are daily backups of all files. It offers a 30-day trial membership with 50M of space. After this, you pay a monthly fee.

Browsing around your drive is fast and the interface is efficient. Unlike many other services, IBackup allows you to move, delete or share large numbers of files simultaneously. You can upload multiple files and URLs concurrently, and the search feature even accepts wildcards. For example, you can find all the MP3s stored on your drive. Its plug-in, iB-Scheduler, allows for scheduled backups of selected files. Like MySpace and XDrive, file management is Windows Explorer-based. File sharing is handled by generated links which are then emailed out. Users given access to shared files do not need an account of their own.



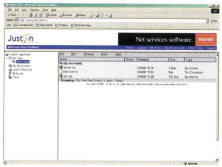
**Pros** Good plug-ins
Scheduled backups
**Cons** You have to pay for it

**Online** www.ibackup.com
**Price** After the trial period, prices range from $US5 to $US800 per month

## JustOn

JustOn offers a flat 50M of space per user. Its basic interface is similar to Windows Explorer. It has a folder tree on the left and detailed information on the right. Pull-down menus have most of the usual file manipulation tools like copy and move, and standard browser actions are used to view and save files.

To share files, you select a file or folder and specify the other JustOn user you wish to share with. The file will then be added to a special directory in the second user's folder tree. Alternatively, you create a public URL which can be used on your Web page to link directly to a file. Recipients don't need a JustOn account to retrieve it.



JustOn can open Microsoft Word and Excel documents inside a browser window. This means users can collaborate online, but can't modify a document and save it straight back to JustOn. Instead, it must be saved to your PC and uploaded to the site.

**Pros** Can create public URLs which anyone can access

**Cons** No Explorer plug-in

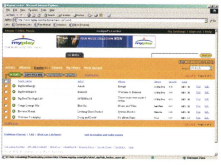
**Online** www.juston.com

**Price** Free

## myplay

If you want to store MP3s, myplay offers a whopping 3G of space. It organises your files into categories, so you can find tracks by artist, album or genre.

Due to copyright issues surrounding MP3s, sharing is allowed only through 'DJ Mixes' (noncopyrighted material). A public area is provided where you can post your own music and invite others by email to listen. To further guard against the redistribution of copyrighted files, all sharing of music is facilitated through MP3 streaming. This means that when you search the public mixes for new music, you probably won't find anything by known artists (except for other users' remixes). Even if you do, you can't directly save it to your hard drive.



Despite these sharing problems, the enormous amount of space provided makes myplay very useful. You can go from place to place with access to your music collection online.

**Pros** Insane amount of space

**Cons** Only for MP3s

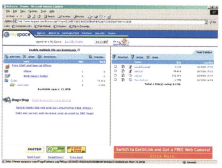
**Online** www.myplay.com

**Price** Free

## MySpace

MySpace has become popular because it provides a large amount of disk space. You can get more than 300M just by signing up.

It has a frames-based interface that is easy to use, but often slow to load. Its layout is the same as many other providers: one window on the left contains root folders and another displays the contents of a selected folder. The service also has a built-in email account. This allows you to mail files directly to your MySpace drive, which is handy considering the long upload times of large files and the unreliability of using a browser plug-in to upload.



Each folder has its own set of read/write properties. For example, you can create a folder called 'Shared' which your friends can upload to. You can even specify an upload limit in megabytes. MySpace's shell plug-in is a must for regular users. It's one of the most stable plug-ins *APC* has seen.

**Pros** Lots of space

**Cons** Sometimes slow to use

**Online** www.myspace.com

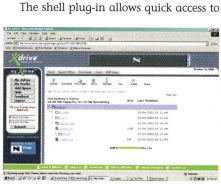
**Price** Free

## XDrive

This is one of the largest mainstream providers. Signing up gets you 25M of space, and you can acquire up to 100M by getting friends and acquaintances to join, or by signing up for ad-laden newsletters. It also increases by 10M after your 10th visit.

The download speed from XDrive is very fast, especially compared to some other sites. This makes it a tempting place to dump your files. In browser mode XDrive only supports remote saving of files when there is a pre-made link. This doesn't really save the file; it just creates a link back to the original. The advantage of this is that these files don't take up precious space.

The shell plug-in allows quick access to your files for upload and download, and can also be used to avoid the problems in the Web interface version. For example, you can right-click on a link, choose 'Save to My XDrive' to remotely save the file, and it will usually be transferred instantaneously.



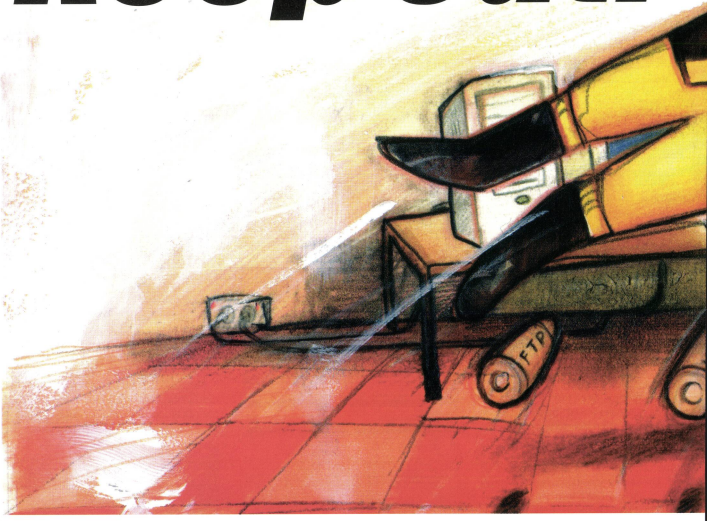
**Pros** Fast downloading

**Cons** Extra space mainly gained by convincing others to join

**Online** www.xdrive.com

**Price** Free

# Keep out!



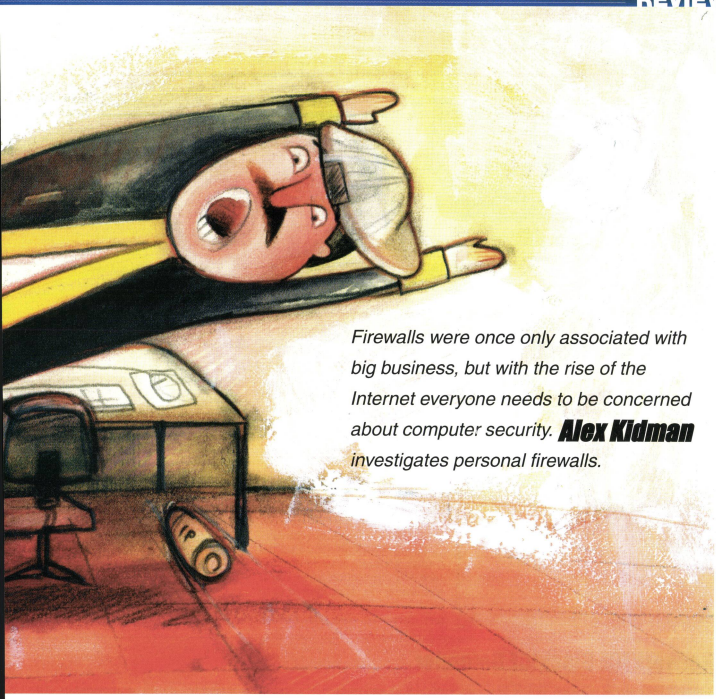

Computer cracking is a serious business, and while a lot of us don't have especially sensitive information to guard, privacy is important. Catching offenders once the damage is done is difficult, so it's much better to stop them getting into your system in the first place.

## Firewall basics

Firewalls monitor and regulate the ports on a networked computer. The computer doesn't have to be connected to the Net — it's perfectly feasible to use a firewall to protect a system with sensitive information from within an intranet. Any system on an IP network without a firewall has 6,334 ports open to the flow of data. Some ports have a common use on most systems: port 21 for FTP transfers, 80 for HTTP data (Web surfing) and so on. Opening a port, or allowing it to be open, creates a two-way data flow. For example, to request the front page of **apcmag.com**, you need to send a request to the **apcmag.com** server, which then responds and sends the page through to your browser. A firewall application allows you to monitor what your ports are doing, block unwanted access, and allow legitimate traffic.

It's important to think about what your system could be used for in the event of a successful crack. If you connect through a modem for one hour a week, the likelihood that a cracker will target your system is pretty low. If your system holds nothing more than a few games for the children and personal letters to family members, it's even less attractive. However, if you have a permanent cable connection, store your credit card details on your machine, and happen to subcontract to the Department of Defence, there's good reason to be worried. Even if there's little on your system, a cracker can use your IP address to mask their own activities and anything they do appears as if you're doing it.

Most commercial firewalls have a general rule that governs system access in all cases, and specific rules that come with



*Firewalls were once only associated with big business, but with the rise of the Internet everyone needs to be concerned about computer security.* ***Alex Kidman*** *investigates personal firewalls.*

the software or can be created on a case-by-case basis. For example, you might want to block all outside access, but allow your friend Bob to use your files. In this case, you create a rule that recognises Bob's IP address, but stops all others.

## Common cracks

The trick to getting past a firewall is convincing it that you (the cracker) are legitimate traffic. The firewall makers' challenge is to minimise the opportunities for crackers to do this.

No firewall, especially a commercial product that many people have access to, is bulletproof. It will protect you against the vast majority of crackers, who run automated port scanning programs across a wide variety of machines, but there are a few crackers it won't block. Like a virus checker, a commercial firewall protects you from most things, but can't guarantee immunity from new attacks.

## How we tested

*APC* Labs tested the firewalls' basic capabilities. The products we looked at are meant to be personal firewalls, so we paid special attention to the features designed to aid new firewall users. Was onscreen layout easy to follow? Were there help files to assist in setting up rules, and explain different attacks?

*APC* also ran a variety of basic Net applications from within the firewall, using the software's maximum security settings. A good firewall should block (or at least query) all external access attempts.

We ran some simple scans and port accesses against each firewall. These weren't likely to break the firewalls, but we wanted to test their responses to see how well they picked the accesses, and how they described them. A Net-connected machine deals with hundreds of port accesses over a single session, and not all of them should be blocked.

# Aladdin eSafe Desktop

eSafe Desktop is a firewall and virus protection package. It looks good, but *APC*'s tests produced uneven results. As with most virus packages, the eSafe takes quite a few minutes to scan your drive. This can be a little frustrating. However, the firewall component wasn't quite as thorough and failed to report often enough, even on the most rigorous settings.

The eSafe desktop is quite minimal. This stops novices messing things up, but it isn't very informative. You can set the firewall paranoia level, but that's about it.



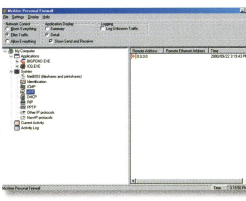

More configuration is possible at the administrator level, but *APC* encountered problems there as well. At its highest setting, it blocked HTTP access but allowed all ICQ traffic through. No matter what the setting, it didn't pick up and report our attempts to access it remotely. We weren't attacking very aggressively, but it is useful to get information *before* a vigorous attack occurs. Programs that don't report every triviality are appealing, but this one tends to underreport. With so little information, it's hard to be sure it's actually working — we couldn't even get the built-in report tool to work.

**Pros** Virus protection a bonus
**Cons** Dodgy rule adherence

**Contact** Aladdin
**Phone** N/A
**Online** www.ealaddin.com/esafe/desktop/index.asp
**Price** Free

# McAfee Personal Firewall

McAfee has a good reputation in system utilities. Consumers trust the brand and this probably helps sell copies of its personal firewall.




McAfee claims that the firewall can be set up by anyone. The default settings are good, but you do need some knowledge of networking jargon before you can tinker with the settings. If you're extremely paranoid, you can turn on all reporting functions, but doing so may drive you insane. *APC* very quickly tired of having perfectly innocuous results thrown back at us as though they were serious breaches of security.

The firewall's insistence (at the default settings) on us confirming each Net application as we ran it was impressive. This allowed us to block some applications fully for test purposes, and the firewall stopped us opening them every time we attempted to.

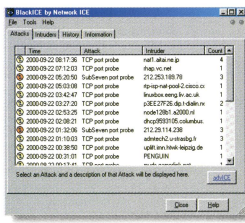
McAfee Personal Firewall doesn't put itself into the startup sequence automatically. There is a function to do this, but many people might miss it, and assume the firewall's working when it isn't.

**Pros** Solid firewall
**Cons** Not autoloaded

**Contact** Harris Technology
**Phone** (02) 8879 5260
**Online** www.mcafee.com
**Price** $53

# Network ICE BlackICE Defender

BlackICE Defender is relatively simple to install and configure, and unlike many other options *APC* looked at, very easy to understand if all you want to do is install your firewall and then forget about it.



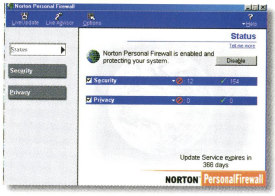

The program also performs automatic DNS searches on attackers. This doesn't help much if the attacker is hiding behind a fake or proxied IP, but *APC* was surprised at the number of (obviously dumb) crackers who failed to do this.

**Pros** Easy to set up
Easy to use
**Cons** If bought online, the manual is a 72-page PDF. That's a lot of printing.

**Contact** Network ICE
**Phone** N/A
**Online** www.networkice.com
**Price** $US39.95

# Norton Personal Firewall

When *APC* last examined Norton Personal Firewall (see *APC* September, page 50), we were critical of its payment model: an expensive annual subscription to access its definition files. This model has not changed. Unless a rule is specified, Personal Firewall uses Norton's own rule settings. This is fine as long as you keep them up to date, and can afford to do so.




If you're not willing to pay regularly, you end up with an outdated firewall that is quite easy to use.

In *APC*'s tests, Norton Firewall picked up all the incoming scans, and gave reasonable but far too simplistic explanations of what they were.

Reporting was very detailed, across a tabbed interface. Like ZoneAlarm, there is a tendency to overreport, which means that although many rules are predetermined, a lot of time must be spent configuring the rules after installation. If you don't know the names of your host ISPs or servers, or what a UDP connection is, you risk blocking a harmless connection.

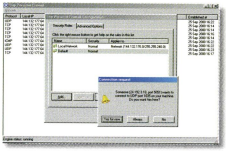
**Pros** Good interface
**Cons** Expensive subscription model
Attack explanations too simplistic

**Contact** Symantec
**Phone** (02) 8879 1000
**Online** www.symantec.com.au
**Price** $108

# TinySoftware Tiny Personal Firewall

Tiny Personal Firewall's interface is the most basic of all the firewalls we reviewed. It provided the least onscreen information, but did warn of intrusions in an acceptable manner.

The application doesn't load automatically upon installation, but as long as you can get past the sparse application screen, you can load it on boot.



Like Norton Personal Firewall, Tiny Personal Firewall acts on a rule base, allowing you to set connections on a case-by-case basis. Again, this isn't easy for novices, but allows for a lot of flexibility in setup parameters. If you prefer, Tiny Personal Firewall can set a general connection rule, but you'll find this very limiting very quickly.

In *APC*'s testing, it gave good, fast warnings of attempted connections, but wasn't particularly fast. It blocked and unblocked applications as we changed the rules, blocking and unblocking an ICQ session when we told it to.

The Tiny Personal Firewall is good for tracking what your machine does with an Internet connection. It tracks all outgoing port communications, and presents an ongoing summary onscreen. By far the largest number of attempted connections it tracks should come from your own machine.

**Pros** Flexible setup
Tracks everything
**Cons** Slow response
Lacklustre interface

**Contact** Tiny Software
**Phone** N/A
**Online** www.tinysoftware.com
**Price** $US29

# Zone Labs ZoneAlarm



If logging and checking every last thing your system does interests you, then you'll love ZoneAlarm. It checks and queries just about everything. This is admirable, as very little gets past it, but having a pop-up window ask you to permit every last application quickly becomes tiresome.

*APC* couldn't fault ZoneAlarm's interface, which is powerful and easy to understand. Sliders are used to set basic rules, and specific connections can be allowed or denied. Like BlackICE, ZoneAlarm attempts to explain the violations it blocks, but it was less successful in backtracking IP addresses in our testing.

ZoneAlarm is free for home use. ZoneAlarm Pro, which costs $39.95, has email filtering and advanced logging features for SOHO setups.

**Pros** Fast response
Warns on everything
**Cons** Less effective DNS lookup
Tracking everything can be painful

**Contact** Zone Labs
**Online** www.zonelabs.com/zonealarm
**Phone** N/A
**Price** Free, ZoneAlarm Pro $US39.95

EDITOR'S CHOICE
Australian Personal Computer

**Network ICE BlackICE Defender**

**Highly commended**
Zone Labs ZoneAlarm

BlackICE Defender is a comprehensive and easy-to-use personal firewall. *APC*'s testing wasn't the toughest challenge, but BlackICE met it well, and responded exactly as you'd want a firewall to.

ZoneAlarm checked every single Net-related activity *APC* initiated. It would be satisfactory for most home systems.

[pb] pocketbooks

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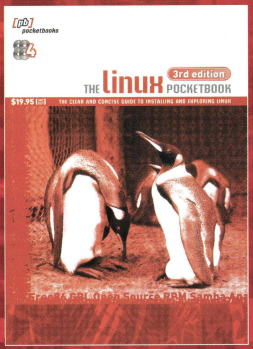
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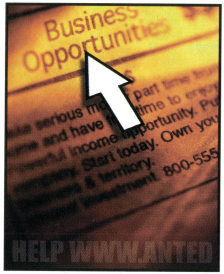
# Job battle moves online

Introducing ebusiness systems presents many challenges, but perhaps the most formidable is finding staff to build them in the first place. As our investigation on page 118 reveals, there are few signs that the IT skills shortage is easing.

A widely acknowledged factor in this problem is the relative ease with which IT workers can find new jobs by using Web sites. Print resources such as the Tuesday computer section in the *Australian* remain important to the recruiting process, but IT has been one of the first areas to embrace the Web as a recruitment device.

A study by IDC estimates that spending on IT recruitment online advertising in 1999 topped $14.7 million. With a predicted compound annual growth rate of 86.2%, this figure is expected to reach $329 million by 2004. The number of jobs advertised won't necessarily grow at the same rate, since much of the additional spending will come from added features such as microsites to attract workers to particular careers. Nonetheless, it's clear that competition will continue to be tight.

Government-funded studies into the extent of the problem continue, but companies seeking to attract and retain skilled employees are still best advised to pursue the simple but obvious tactics: create a pleasant working environment, ensure projects are adequately staffed and funded, provide regular training, and ensure you have lines of succession in place. None of these will prevent 'job hopping', but they will help discourage it and minimise its impact.




## This month's buzzword: X Internet



### Why do we need this term?

The terms 'intranet' and 'extranet' have gained currency, but other attempts to produce variants on the name 'Internet' have been less successful. Remember the overnet? Or the even less commonly discussed ubernet? Thought not. X Internet is the latest addition to this not terribly edifying list.

### What does it mean?

Coined by Forrester research chief George Colony, the X in X Internet stands for 'executable'. As Colony explains, "Web communications are conducted via the exchange of pages, but the new software model will use executables." Of course, some people might argue that this model has already been partially implemented with technologies such as Java or Flash, both of which allow interactive communications between users on different servers through applets hosted within Web pages. In Colony's vision, the executables will be exchanged directly, without an intervening layer. How different this is from emailing file attachments will presumably be a subject for debate.

### When should I use it?

If you're in the process of developing content applications that you're planning on deploying on a range of client platforms — and let's face it, who isn't these days — then the term may be useful. Try casually dropping, 'We're working towards an X Internet baseline model for future deployables' into the conversation.

Or not.

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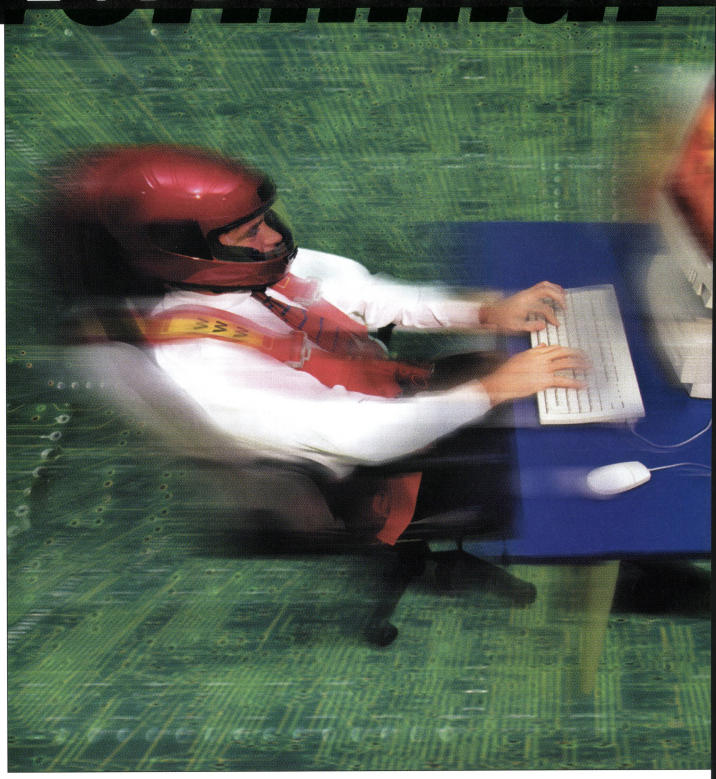
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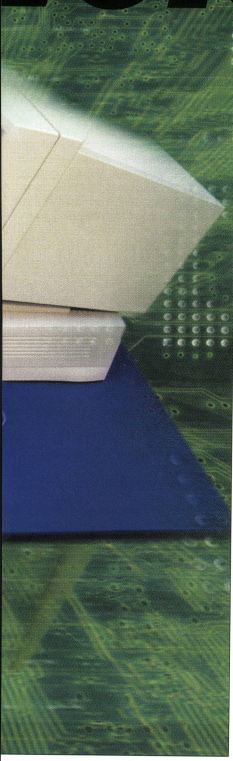
## Patch Panel

The Patch Panel section on CD 1 of *APC*'s cover CD pack includes the latest patches and updates for a wide range of operating systems and applications. Check page 14 for details.

# Terminal



# velocity



*Thin clients have failed to live up to industry hype, but in the past few years the concept behind them has quietly transformed the computing landscape.* ***David Braue*** *looks at the bright future of the thin client industry and compares the four super thin client services available.*

Not too long ago, Oracle chief Larry Ellison was declaring that the thin client would oust the venerable PC from corporate desktops forever. Ellison — and the industry his hyperbole helped create — has since abandoned these claims. Last year thin client sales fell far short of their projected $US100 million.

However, the concept of the thin client has been anything but a flop. The industry's rhetoric about the value of smarter computing paved the way for dramatic changes that have reshaped computing over the past four years.

A new generation of Web-based productivity applications is taking hold. Application service providers (ASPs) are preparing to rent access to major business systems, something that previously took years to implement. Even PC stalwarts Compaq, IBM and Hewlett-Packard have introduced slimmed-down desktops that eschew complex legacy systems in favour of thin client-inspired design.

Even more revolutionary, businesses are embracing the mobility and connectivity of PDAs, wirelessly connected notebook computers and portable Web tablets. Their economy of design makes them perfectly suited to the thin client-driven push for more efficient networked applications.

The Unix-based X Window System and other earlier systems provided methods for remote display of server-based applications, but the modern thin client era really took off with Citrix Systems's efforts to create a multiuser version of Windows NT. The product it built, WinFrame, single-handedly brought Windows into the thin client world. However, this backfired on Citrix when Microsoft announced plans to create the Windows-Based Terminal Server (WBTS), its own thin client add-on for Windows NT.

Citrix bounced back with the MetaFrame add-on. This provided NT 4.0 support for its now-universal ICA (Independent Computing Architecture) protocol, as well as features like load balancing and clustering, which enabled construction of server farms to support large numbers of thin client users. Since then — and particularly since ASPs began picking up steam 18 months ago — Citrix has become the de facto standard for thin-client delivery of Windows applications. Despite the best efforts of the anti-Microsoft crowd, these continue to dominate corporate computing environments.

## Benefits

Businesses that have made the move to thin client computing have gained clear and often dramatic benefits. Employees no longer waste IT support staff time by misconfiguring their desktops, software updates can be deployed to every user through the central server, and the widespread availability of multiplatform or Java-based thin client applications means employees can access corporate applications from anywhere.

According to Peter Butler, IT manager with the Police Credit Union (PCU), Citrix

WinFrame and MetaFrame have saved the company over $500,000 by streamlining the maintainence of the company's distributed network infrastructure.

PCU installed WinFrame in 1998 to avoid "the logistical problems associated with PC-based networks, such as having to load software on remote PCs", Butler said. "It's not easy for a small to mid-range company, because we just don't have the money to throw at a full-blown distributed PC network. We looked at traditional PC-based environments, but they were starting to get into the area of being cost prohibitive."

WinFrame simplified software distribution and reduced administrative staff numbers, so PCU upgraded to MetaFrame in mid-1999. The 60 PCs in its branch offices in Canberra, Newcastle, Wollongong, Gosford, Parramatta and Penrith were steadily replaced with Wyse Winterm thin clients as it shifted to MetaFrame.

"MetaFrame gives us power because we can do everything locally," Butler said. "We have a small IT department, and the MetaFrame servers are all in one spot. Using frame relay connections to each location, we can update the software quickly and easily. I would have to double my staff to do the same things in a PC-based network."

Thin clients were originally marketed as lower-cost replacements for desktop PCs, but small businesses value their ability to reduce staff numbers. Not surprisingly, Citrix now has Unix-based competitors that are capitalising on the growing acceptance of Unix as a Web and corporate application platform to position thin client access as just another standard inclusion.

There is still some distance between Citrix and its closest competitor, the Santa Cruz Operation (SCO), but SCO's recent restructuring has made the success of its Tarantella thin client platform essential (see *APC* October, page 122). Citrix recently launched a Unix server-based version of WinFrame, but SCO (renamed Tarantella Inc. to reflect its new strategy) is moving into the Windows market after recently expanding Tarantella to support Windows servers and Solaris.

## Marketing hype

Citrix and Tarantella will soon face new problems as thin client characteristics become standard in operating systems such as Sun Solaris, Windows 2000 and Linux. Instead of being driven by marketing hype, customers are gradually taking up thin clients in response to their own IT strategies.

"We're not pushing the Sun Ray thin client paradigm any more because the press would hammer the product into submission," Sun CEO Scott McNealy told journalists during his recent visit to Canberra. "We let word of mouth promote it, and just let people discover it. And they are discovering it. I've been using a Sun Ray as my desktop for a year and a half now, and it's great. What you're seeing is that the Wintel thing has stalled and, in fact, it's losing share."

The thin client market is growing far more slowly than predicted four years ago, but analyst firm IDC recently found that sales are picking up. Shipments of enterprise thin clients in 1999 were 89.9% higher than the year before. Even so, 699,895 units is a relatively small portion of a PC market worth $US489 million worldwide.

IDC projects that market share will grow nearly tenfold by 2004 to more than 9.5 million units worth about $US3.9 billion. IDC believes the strongest growth will come from outside the US. In Asia, demand was expected to increase by 175.4% last year alone. Increased market presence is expected to drive prices down. IDC predicts that thin client prices will drop from an average of $US699 in 1999, to just $US409 by 2004.

# Citrix MetaFrame



Building on Citrix's position as the only provider of multiuser Windows NT 3.51, MetaFrame brought the same capabilities to Windows NT 4.0. However, its biggest partner, Microsoft, also became a competitor with the release of Windows-Based Terminal Server as an add-on to NT 4.0 and a standard feature of Windows 2000.

Undeterred, Citrix has continued to run rings around Microsoft by positioning MetaFrame, currently in version 1.8, as an addition to the Windows NT/2000 code base. MetaFrame provides support for automatic clustering, load balancing and failover among groups of connected servers, which is critical for supporting large numbers of users. MetaFrame is also essential for delivering Windows applications to non-Windows users. Its 20 free client applications provide native support for almost every desktop and handheld operating system, and support for any other OS using Citrix's Java client.

"We welcome the integration of Terminal Server into Windows 2000," Citrix Asia-Pacific product marketing manager Radu Macovei said. "This way, every user of Windows 2000 will have a taste of server-based computing. However, if they want to implement thin client apps on a wider scale, they'll need to look at alternative and third-party solutions."

MetaFrame includes wizard-driven application publishing, automatic installation of applications to multiple servers across a server farm, audio support, automatic client updates, client-side printing, multiple-monitor support, application permanence, session shadowing (invaluable for remote user support) and SpeedScreen 3 technology for improved responsiveness.

These features, along with the inherent efficiency of Citrix's ICA protocol, make MetaFrame the standard tool for using thin client applications. It has also been embraced wholeheartedly by the growing ASP movement, particularly since Citrix released its iLicense licensing program.

Last year, Citrix significantly expanded its product range with the launch of MetaFrame for Unix. This effectively adds ICA support to Sun Solaris servers, and offers Citrix Extranet for extending access to applications to business partners over the Net. It also includes NFuse, an online portal for creating personalised, Web-based interfaces combining online and intranet-based information with instant access to corporate applications. All will help the company maintain its comfortable dominance for some time.

**Pros** Good additions to Windows NT/2000
Supports virtually every OS

**Cons** Two-tier architecture means server problems can interrupt sessions

**Contact** Citrix
**Phone** (02) 8870 0800
**Online** www.citrix.com.au
**Price** Basic 15-user concurrent licence $US4,995; additional licences $US200

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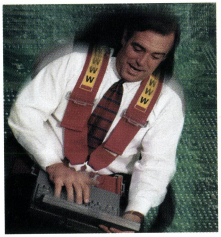
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# Microsoft Windows Terminal Server



Microsoft introduced the Windows-Based Terminal Server (WBTS) as an add-on to Windows NT 4.0, which caused many to question the long-term viability of Citrix. However, Microsoft's move was far from a death blow. The company took a rather different approach from Citrix, and left plenty of room for third-party value adding.

WBTS is built into Windows 2000 Server and is now known as Windows 2000 Terminal Services (WTS). It is based on Remote Desktop Protocol (RDP), a Microsoft-developed thin client protocol that performs some of the same functions as ICA and AIP (Adaptive Internet Protocol). Microsoft sees Windows 2000 desktops as the best way to access Windows servers, so RDP has been embedded within dedicated hardware terminals from Wyse, Boundless, NCD, IBM and other manufacturers.

In the WTS paradigm, RDP is just another delivery method; Citrix's back-end specialties, such as clustering, failover and load balancing are handled by related Windows 2000 services. Microsoft intended this integration as a means of allowing developers to deploy virtually any application remotely, relying on the infrastructure services provided within Windows 2000.

WTS only works in Windows environments, so it's weaker than MetaFrame and Tarantella in multiplatform corporate environments. Legacy platforms can be accessed by giving remote users access to another server hosting Windows 2000-based terminal emulation software, but this adds an extra layer of complexity by providing an additional Windows server to manage.

Where WTS falls short is in its licensing terms. Citrix offers concurrent licensing, where businesses pay for a limit on the number of users that can access the thin client services at any one time. Microsoft charges a per-seat licence based on CALs (client access licences). Although CALs are less expensive than MetaFrame licences, businesses must pay per potential user which makes WTS a more expensive solution for all but the smallest companies.

**Pros** Provides tight integration with Windows servers for NT/2000

**Cons** Unsuitable for non-Windows desktops or servers

Per-seat licence can be expensive

**Contact** Microsoft
**Phone** (02) 9870 2200
**Online** www.microsoft.com/australia
**Price** Windows 2000 Server five-client licence $1,786; five-user WTS CAL $1,350; Windows 2000 Server 25-client licence $3,105; 20-user WTS CAL $4,827

# Tarantella



Unix vendor Santa Cruz Operation (SCO) produced Tarantella as an add-on for the delivery of Unix applications to remote users. Last year, SCO jettisoned its Unix business to focus exclusively on Tarantella. Version 2.0 was launched early last year and version 3.0, launched in October, is a total rewrite that supports up to 600 users per 700MHz server.

Tarantella is working hard, but in the Australian market Citrix is synonymous with 'thin client'. However, the addition of support for Windows NT and 2000 in version 2.0 has made Tarantella a viable alternative to Citrix. It has some distinctive architectural features that have won it a small but growing following.

Tarantella supports load balancing in multiserver environments and is based around AIP, which dynamically monitors line performance and adjusts bandwidth usage according to client capabilities. AIP is implemented as a Windows application for Windows desktops, and as a Java applet on any other platform. Tarantella can access a broad range of servers including SCO UnixWare and OpenServer, Compaq Tru 64, IBM AIX, Hewlett-Packard HP-UX 10, Sun Solaris, Windows NT/2000 and various versions of Linux.

Tarantella natively supports more communications protocols than MetaFrame, including Microsoft's RDP, TN3270, Wyse 60, X11 and the full range of VT terminals. This effectively combines mainframe and midrange terminal emulation with application hosting, which is important in multiplatform environments. In contrast, MetaFrame can only provide this terminal emulation by setting up a separate Windows server running emulation software, then providing access to that server.

Unlike Citrix's two-tier design, Tarantella has a three-tier architecture, and its servers operate separately from the application servers they connect to. This means setting up and administrating a dedicated Tarantella server, but customers report that a more robust thin client architecture is the result. This is because Tarantella can keep customer sessions alive, even when application servers fall over.

Tarantella is also targeting ASPs. An ASP-specific version that includes billing and accounting features and a partnership program, is strengthening its presence in the ASP market. Only time will tell whether Tarantella can weaken Citrix's market dominance.

**Pros** Three-tier architecture improves flexibility and session stability

Built-in terminal emulation facilitates access to mainframe and midrange legacy applications

**Cons** Separate server means more administrative work

**Contact** Tarantella
**Phone** (02) 9966 1999
**Online** www.sco.com.au
**Price** Basic 15-user concurrent licence $US4,995; additional licences approximately $US200 each

# X Window System



The X Window System was developed as a standard way of providing a graphical user interface for Unix operating systems. Unlike the client-heavy design of Windows, X allows application graphics processing to be distributed between client and server, depending on each system's free resources. Platform-specific implementations of X differ, but the application interface into X is standardised for seamless connectivity between all types of clients and servers.

The X Window System was primarily designed to run over local area networks. However, its flexible design — and improvements in remote communications technologies since its advent — have made it more practical to use over dialup connections and the Internet.

Developed through a worldwide coordinated effort, the X Window System is released by X.Org. This organisation is part of The Open Group, which handles X design specifications and management of the code base. About 16 companies are currently members of X.Org. Members range from IBM, SGI, Hewlett-Packard, Compaq and Sun, to remote access and terminal emulator developers such as Hummingbird and Attachmate. Also participating is the XFree86 Project (www.xfree86.org), which maintains the free XFree86 set of libraries incorporated into every version of Linux and many other Unix versions.

Businesses with large numbers of Unix users are using the X Window System every day for computing and graphically intensive applications such as CAD, but the platform is not easily implemented for general corporate use. This failing, along with increasingly common Windows environments, will turn smaller businesses off the X platform. Its focus on being exclusively an application delivery platform means it lacks the load balancing, user authentication and other features provided by other thin client applications.

However, X — and its worldwide developer community — is still very valuable as a resource for the creation of corporate applications. For developers wishing to take the time, X is a useful resource for creating client/server applications.

**Pros** Good resource for creating client/server applications

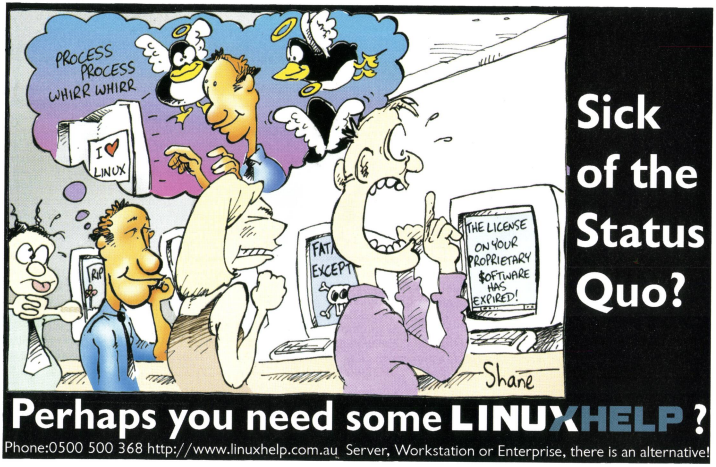
**Cons** Lacks load balancing, directory integration and other features

**Contact** X.Org

**Phone** N/A

**Online** www.x.org

**Price** Free, as implemented in the commonly used XFree86 libraries



# Learning from the Microsoft crack

*If Microsoft can't stop intruders in its network, what hope is there for smaller companies? **William Maher** looks at the security lessons that can be learnt from recent events.*




Microsoft's recent data security breach might have come as a shock, but it only confirmed what many have known for years — one oversight can render an expensive data protection scheme useless.

Microsoft's oversight was allowing a virus, disguised in an email, to be installed inside the company's firewall. Once the virus was up and running, intruders were reportedly able to sniff out security passwords and even gain access to vital source code being worked on by Microsoft developers. Whether or not the breach posed any real risk, it was still a public relations embarassment to a software company keen to portray a secure image with corporate customers.

Another report from the US claimed a new email virus had managed to infect at least 10 Fortune 500 companies. The file didn't appear to corrupt data, but was able to spread quickly and had the potential to overload Microsoft Exchange email servers.

Both incidents have shown that even the most inconspicuous email message can thwart expensive data security. In many cases, it's not the technology at fault, but the people who run it.

This is the view held by Microsoft, which has since pulled the plug on some Internet servers after realising security update patches hadn't been installed. The company is working on better intrusion detection, but Redmond's chief information officer Rick Devenuti said the solution lies with educating staff about security risks.

"I would like to blame all the problems lately on security technology, but the fact is, that's not the case," Devenuti said in November at Com Tech's industry forum in Queensland.

Devenuti revealed that virus protection has been an ongoing problem for Microsoft's US headquarters. At the time of the infamous Melissa virus attack in early 1999, he estimates that less than 40% of the company's desktop PCs had virus protection.

He added that although virus protection is used at Microsoft, it is often removed by staff wanting to to make their PCs as efficient as possible. "It slows things down," was Devenuti's explanation.

His comments are supported by Peter Sandilands, regional general manager of Israeli data security company Check Point Software Technologies. Sandilands believes the recent data intrusion at Microsoft is a people problem, not a technology problem. According to Sandilands, "An update that should have been in place wasn't. You can have the best technology in the world and still have an insecure environment."

Data security risks posed by the Internet are well documented. US research and education cooperative, the SANS Institute, has even compiled a list of 10 of the "most critical" online threats.

Most of the threats result from security gaps in widely used software for Internet servers. This includes popular BIND packages used on domain name servers, CGI programs installed by default with Internet server software, the Sendmail email program, the Sadmind remote administration tool, and even the ubiquitous SNMP (Simple Network Management Protocol).

Vulnerabilities are not confined to one brand of software. The SANS Institute lists

UNIX, Windows, Linux, Solaris and Macintosh as vulnerable to hacks. In most cases, the remedy involves a software patch or altering settings on Internet servers and associated devices.

Despite the availability of these solutions, market advisory firm IDC estimates that at least 35% of IT departments it has surveyed have been victims of severe security infringements. This includes unauthorised access to corporate data, as well as unauthorised use of applications and email.

Even more worrying is that many breaches occur from inside a company. IDC estimates that over half of all security breaches are committed by internal staff — not a comforting thought for IS managers.

## Cashing in

Security software and hardware is becoming big business as companies scramble to protect themselves against unseen foes. Sales of firewalls and virtual private networking software have made Check Point Software a net income of $US140.2 million in the nine months ending September 30, 2000. This is an increase of more than 100% on the previous year's return.

Sandilands estimates that up to 22% of Check Point's revenue comes from the Asia-Pacific region. "We're still making money — we're actually profitable. That's a big shock to people," he said.

Sandilands attributes the company's rise to the take up of off-the-shelf security products. "When Check Point started, it was just firewalls. There really wasn't a product you could take instore and configure," he said.

The increasing emphasis on security breaches, particularly in the media, means that spending on data security is only going to increase. The strongest indication comes from Forrester Research, which interviewed 50 security managers from global companies for its October 2000 report *Sizing the Security Market*.

Forrester found that on average, interviewees expected security spending to increase from $US2.9 million in 2000 to $US4.5 million in 2002 — a compound annual growth rate of 25%.

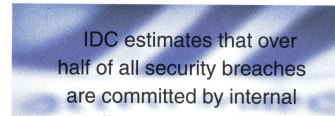
Security spending among the 50 respondents was split between core security (36%), planning and management (25%), incident response (16%) and access control (23%). Incident response is forecast to make up 20% of expenditure by 2002.

"We'll be ramping up our spending on incident response and monitoring. I think the biggest factor driving that is global awareness. With all the press coverage of security breaches recently, companies have no choice but to invest in security," said one respondent from an electronics company.

Another area tipped to increase in importance is security outsourcing. Forrester predicts outsourced services will account for 13% of security budgets by 2002.

All this means more money for the security vendors. Check Point Software has moved into outsourcing, as has system integrator and service provider Com Tech, soon to be renamed Dimension Data Australia.

Whether any of these solutions reduce the incidence of security breaches like that experienced by Microsoft remains to be seen. Author of the Forrester report, Frank Prince, is very pessimistic.




Prince predicts that while security spending will grow, "bad decision-making" will ensure mediocre security levels. The report further suggests that "reactive investments" over the next four years will leave firms little better off than they are today.

A lot of money will go into security outsourcing, but Prince thinks such services will temporarily taper off when security mishaps continue. By 2006, he says "clueless managers" still won't have learnt from the many security mistakes.

## Vendor flack

Some hardware and software manufacturers are also likely to suffer as a result of ineffective security measures, particularly as competition increases. A case in point is Public Key Infrastructure (PKI), which doesn't ward off hackers, but does provide added confidence when making online transactions.

Despite interest in digital certificates and PKI, anecdotal evidence suggests the technology is not yet widely used in Australia. This view is supported by Ann Knight, national security manager for Com Tech.

"PKI is an idea that's been around for a long time. It's still being talked about and it's not happening," she said.

Knight cites cost as one of the main factors limiting uptake in PKI, which allows companies to authorise online transactions using electronic keys. She also described PKI technology as still "somewhat immature".

Meanwhile, eSign Australia warns that many PKI vendors may have trouble surviving without revenue from outside Australia. The company's local managing director Gregg Rowley predicts that only a handful of vendors will survive in the long term.

Several PKI vendors have already experienced stock market jitters as competition increases. In mid-2000 a profit warning from PKI software company Entrust triggered a stock slide in the US affecting Check Point Software, VeriSign, Axent Technologies and the Internet Security Systems Group.

However, it's not all bad news. In the long run, Forrester predicts PKI will take off as companies realise the need for access control. In its survey, digital certificates were one of the only technologies respondents cited as prompting spending.

Other security challenges, such as the appearance of online business exchanges or 'e-marketplaces', are also emerging. Negotiating a cohesive security strategy for these networks could prove to be a nightmare.

Another problem looming on the horizon is the increasing automation of business processes such as accounts and procurement. In this area, internal staff are likely to pose a real security problem.

Prince's view is that IT alone can't solve the problem. He predicts that by 2005 the security boom will have run out of steam, security breaches will be commonplace and IT security will become "just another budget item to cut".

If Forrester's advice is to be believed, the real challenge will lie in making sure that security becomes an integral part of a company's business processes. As the Microsoft case has illustrated, if you don't have the will to improve security, all the technology in the world amounts to nothing.

# 2001: An online odyssey

*The Federal Government has set a deadline for providing online services, and its increasingly tech-savvy constituency is keen to begin using them.* ***David Braue*** *spoke to Senator Ian Campbell about how this business revolution is progressing.*

Industry watchers have been talking about online government interaction for years, but so far online government programs have been largely experimental, and have met with a lukewarm reception. Some examples are Victoria's maxi, Telstra's Transigo government procurement service and the ATO's online digital certificate-based business activity statement system.

Despite only marginal success, these programs represent a real commitment on the part of the government. As the government looks for new ways to cut costs and improve efficiency, many departments are finally readying for an all-out push online.

Senator Ian Campbell — manager of government business in the Senate and parliamentary secretary to communications and IT minister Richard Alston — is determined to give businesses and citizens online access to government services in 2001.

The senator has become an active technology evangelist, and is determined to help deliver the online government that John Howard has been promising since 1997. Campbell maintains contact with business leaders and government departments, and has helped set targets for getting key government services online this year. He believes that the move will provide the critical mass necessary to bring Australia's business community into the world of business-to-business ecommerce.



▲ Campbell: The government must provide a range of options for online interaction with businesses and the public.

Senator Campbell told *APC* why he's dedicated to online government, and how he's supporting the biggest business revolution in years.

**APC:** *What do you see as the main motivation for getting government online?*

**Campbell:** The government is the single largest segment of the economy, accounting for around a quarter of the economy. If you want the whole economy to be as efficient and internationally competitive as it can be, and our businesses to compete in an international marketplace and survive and prosper, you need to make sure the government sector is at the forefront of adopting the best Web-based systems and technologies for its own internal operations.

If the government is not always ahead of the game, it will be a drag on the whole economy. We believe that by moving ourselves online we can significantly improve the service quality that we provide to the citizens of Australia, and should be able to reduce the time they spend dealing with the government. This has the potential to lift the whole economy.

**APC:** *But customers have been fairly apathetic towards online government services, and barely half the population is even using the Internet on a regular basis. Aren't you being a bit optimistic?*

**Campbell:** We address a number of realities. First, although Australia is one of the most connected societies in the world, the number of people who use email every day is still not a majority of the population. Those people who are doing Web stuff as regularly as they use the phone will want to interact with the government in the same way that they interact with their bank. I think we have an obligation to be there.

But you don't just tailor your services to those who are in the minority. Although one of the primary means of access will be from the PC at home, you have to ensure services are also available to people who don't have an Internet connection. We're building a program that ensures access to the Net at libraries, schools, telecentres, which are communal Net access centres spread across rural areas, and a whole range of different locations.

And being online doesn't necessarily mean you're sitting at a computer. If I've got a WAP phone, I'm still online. We're encouraging our departments and agencies to put their content through portals that can be adapted to these types of technologies. Our vision is that you can change the address on your dog licence and it won't matter where you are.

**APC:** *There is a huge spread, in terms of quality and functionality, among the Web sites currently administered by federal departments. How will you ensure a more consistent — and hopefully intuitive — interface for customers?*

**Campbell:** The National Office of the Information Economy, which has now merged with the Office of Government Online, has developed best-practice guidelines in terms of how interactive sites work. We are brokering this by getting departments and agencies to think about whether there are other agencies and departments at a federal, state or local level that they would be dealing with.

For example, the government was probably ahead of most of the rest of the world when they developed the Business Entry Point [www.business.gov.au] that lets people do everything they need to do to set up a business. This includes things like dealing with the Australian Taxation Office, Securities Commission, local and state government approvals, and basically bringing together everything the person needs.

**APC:** *What online targets have you set for the government this year, and how will you help departments reach them?*

**Campbell:** We're now expecting that over 90% of all government-to-business payments will be online by the end of 2001, and we expect all simple procurements — anything that doesn't require special tenders — will be done online.

This all kicked off with the Prime Minister's commitment in 1997 to get all appropriate services online by 2001. The Office of Government Online has been working on the foundations and architecture needed to do that. This includes things like the Gatekeeper public key infrastructure, which is designed to ensure that government transactions can be carried out in a secure environment providing user authentication,

and the FedLink program (www.fedlink.gov.au) to create a communications network between federal departments in a secure environment.

The second stage is to get departments and agencies focusing on what services they need to bring online and how they're going to do that. Much of this will need to be interactive stuff so that people can complete entire transactions online. The Cabinet has required all agencies and departments to put their plans online so it's a very open, accountable process.

They'll be reporting two to three times over the next 12 months on their progress towards their targets. We've based a lot of what we're doing on our Y2K program, in which we made them more responsible to the Cabinet and public.

**APC:** *The last time the government put this much support behind an IT initiative, apart from Y2K, was outsourcing, which some say has been less than ideal. How have the departments responded to the pressure to get online this year, particularly since they're being asked to do so within existing budgets?*

**Campbell:** The response from the departments has been that it's incredibly successful. They're very keen to implement and they've got a fantastic approach. The way the government works the budgetary process is incredibly strict, but they're not allowing budgetary issues to be a roadblock. Their attitude is 'we've got to do this stuff, and just have to make sure it's part of our priorities.' They're running this through their resources and making it part of their operations, and many departments are doing world-leading work.

If we didn't have the outsourcing program being driven by John Fahey and the government, we wouldn't have the sector we have now and wouldn't have the government online as we are. That's not to say that outsourcing hasn't had some problems; there's no way you're going to create a program of that magnitude across the Commonwealth easily.

But to say that you shouldn't have done it is crazy. I'm focusing on building what is needed by the customers, figuring out what the business community needs out of e-procurement, and what mum and dad want from online. If we keep talking about that and don't get carried away with internal engineering, I'm confident we'll succeed.

**APC:** *Promoting online business-to-government interaction should provide major benefits, but most businesses — particularly SMEs — are still relatively unsophisticated in their use of the Net. How will you get them online so they can take advantage of all this?*



▲ "Hello . . . federal government here . . . is anybody out there?"

**Campbell:** One of the government's objectives is to make sure the majority of SMEs get access to government contracts. Nothing we will do will force a business to go online if they don't want to, but if the government takes a leadership role by shifting online, businesses will see that it's a hell of a lot easier than they thought.

We're not going to require that they all have the latest computer with a high-speed modem, but the absolute basics are a dialup connection and a bank account. We believe there will be an overwhelmingly strong business case to get online.

I see G2C, or government-to-consumer ecommerce, as a driver for B2C. When people get used to dealing with their banks and governments online, they'll get more comfortable with it. Our role is making sure the systems are in place, helping departments and agencies with those systems, and working with suppliers to make sure they bring them into the new systems effectively.

**APC:** *Supplier certification programs like PE60 have long kept shoddy suppliers away from government business. How do you retain quality control while opening up supplier markets, as you're doing?*

**Campbell:** This is being considered by the Procurement Council, both across the federal departments and across state jurisdictions. Eventually, state government will be able to sign on via our market and vice versa. If you can get commonality between prequalification of suppliers, if you can recognise state standards, you can do this.

One of the things that the online environment allows to happen is that once you've been through the hoop once, you shouldn't have to do so more times. That's why I think it will drive the business case for many small companies that aren't online to get online.

**APC:** *What's the biggest obstacle you face over the next year?*

**Campbell:** Delivering on the usability of it. We can put this stuff up there, but making sure people come and see it is the challenge for all Internet-based solutions. If government creates a pathway in the park, you'll generally find that's not where people walk; they tend to go where it suits them. I want to make sure the government doesn't lay down concrete to steer people to where they have to interact with the government on the Web.

We want to move away from one size fits all, and want to work closely with people who are supplying services as well. We have to be flexible enough to ensure that when people wander across that grass, we'll be there too. I think this will deliver much better service, and a much better IT industry in Australia.

**APC:** *What does success look like to you?*

**Campbell:** That people be able to do a lot of what they're doing in normal interactions with government online in a secure, cheap, easy way that's convenient to themselves. A great measure of success will be that it just happens, and that it's a smooth move to a new environment that people hopefully will just take for granted. Another measure of success is to see us get to that stage way ahead of our international trade competitors; this will deliver us a huge national competitive advantage across all sectors.

# No end to skills shortage

*IT vacancies remain almost impossible to fill.*

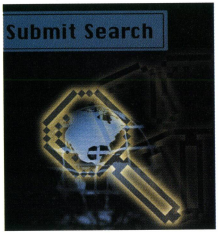
Despite the fact that major implementations such as the GST and Y2K are over, and although the collapse of numerous dot coms has pushed employees into the market, research continues to indicate a major problem in filling IT positions.

In a recent survey funded by technology trainer Com Tech Education Services, 62% of blue chip companies reported vacant technology jobs. When asked to rate the effect of the current skills shortage on a scale of one to 10, 46% of the training managers surveyed gave a rating of six or more. A rating of 10 was classified as a 'severe effect'.

The results have sounded warning bells for companies with large software installations. Of the 62% of companies with vacant IT jobs, 40% reported vacant spots for staff specialising in Windows 2000. This is expected to increase to 42% within the next 12 months. Other skills in demand include project management and Web design.

Com Tech estimates there are one million information technology positions vacant around the world. Analyst group Gartner has estimated that the problem could continue until at least 2005.

Exacerbating the shortage is the still-growing phenomenon of job hopping among those with IT skills (see *APC* December 2000, page 114). In a survey of over 500 full-time employees across Australia, employment agency Seek found workers were very choosy when it came to finding a job. "The Internet is fuelling this trend because it provides free access to an enormous range of jobs," Seek CEO Paul Bassat said. "It's increasingly difficult to keep staff."




The study found that 78% of respondents were satisfied with their current jobs, but only 31% were totally committed to remaining with their current employer. A whopping 50% of employees said they would consider changing jobs if approached by another company. Remuneration and career advancement were the top reasons for making a move.

Bassat said the Seek findings indicate that employee confidence has been spurred by a strong economy. Of those surveyed, 68% agreed with the statement, "If my current job doesn't work out, I will have no trouble finding another job that is suitable." Only 25% said they'd rather stay in a problematic workplace than consider a change.

According to the latest Morgan & Banks Job Index, 68.2% of IT firms were looking to take on extra permanent staff before January 2001. This record figure is a 7.6% increase on the previous quarter.

Morgan & Banks Technology director Ian James predicted the record growth levels will slow down in early 2001. "It is a little too hot at the moment," he said. "I can't see these levels being sustained — the market may get out of control." Contract and temporary employment is set to grow by 15.9% in the next three months, up 4.7% on the previous quarter. James believes the high demand for permanent staff will fuel further growth in the contract market. According to the survey, the highest growth in demand for IT staff will be in small to medium-sized IT outsourcing businesses.

NSW and Victoria have attracted most of this growth. James said Queensland, Western Australia and South Australia had reached the tail end of a period of extremely high demand. "Results were so high that they had to fall off a bit," he said. James acknowledged that high staff turnover in the IT sector contributed to the inflated figures, which are double the overall industry figure. He estimated that 18 months is a typical 'permanent' job in the IT sector.

***Fiona Angus, William Maher and Roulla Yiacoumi***

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# The Web is not enough

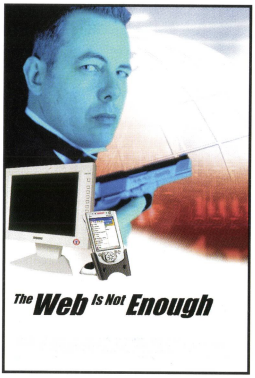
There was a time when it was easy to explain why the World Wide Web and the Internet were two separate and distinct concepts. However, now that so many Internet services are being delivered through the browser window, it's getting much harder to convince beginners that this is true. Rather than requiring individual servers and protocols, FTP, chat and email services are now native to the Web.

Workshop can't provide a complete working knowledge of how to give your old IBM mainframe a Web interface, but this month's Insite shows you how to add a simple chat service to your Web site using ASP. If you're more interested in the back end of your server, our Windows column shows you how to use Active Directory to manage your network more efficiently.

Our other regular columns are equally useful: Technobabble explains how it's possible to make a monitor that's flat; our PDAs column proves that your Pocket PC can be a good read; and Core explains why one PC file system is not always as good as another.

See the contents section to the right to find out what else awaits you in Workshop this month.

*Andrew Colley, Workshop coordinator*

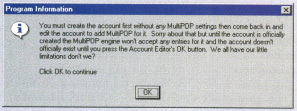



**Workshop is a reader-input section. Please send your ideas, comments or criticisms to workshop@acptech.net, or to our snail mail address: APC Workshop, PO Box 4088, Sydney NSW 1028.**

## Bug of the month



Truth in software? That great philosopher Clint Eastwood once said, "A man's got to know his limitations." The programmers of mail server mdaemon had a similar idea.




Kudos to David Thomas. Go ahead, make(1) my day.

## Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acptech.net or snail mail to APC Bug of the Month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a software prize. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in this column in *APC* February. So start hunting!

*Michael Smith*

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*Technobabble has a look at flatpanel liquid crystal displays.*

# Flattening the image



Last month, Technobabble looked at the technology behind the most common type of desktop monitor: the cathode ray tube (CRT). This month, liquid crystal displays (LCDs) go under the microscope.

LCDs are becoming more popular for desktop screens. The recently reviewed Apple PowerMac G4 Cube and the Palladine LCDpc (see *APC* November, page 24 and page 36) are examples of this trend. However, LCD screens are most commonly used for notebook displays. There are three main reasons for this: they're flat; they're much lighter than CRT tubes; and their power consumption is much lower. The latter is an important consideration for systems that run off batteries.

The basic liquid crystal display consists of a film of crystal in a liquid state, sandwiched between two transparent electrode surfaces. By altering the charge sent between the electrodes, patterns can be made to appear on the outer surface of the electrode at the front of the display.

LCDs work by blocking light out, and by using the 'blocked' section of the screen to display whatever pattern they are instructed to display. The simplest and most common LCD in mass production is the digital watch. The digital watch can be used to illustrate the principles on which LCDs in notebooks and desktop screens are based.

The liquid crystals used in watch LCDs are described as nematic. This means that the crystal is a liquid with molecules that can move in any direction. These rod-like molecules tend to align themselves if there's a force present. Some crystalline structures keep some solid properties as they melt, and this is one of them. The tendency to align was observed as far back as the late 19th century. The crystals are still liquids and the molecules are still free to move around, but at certain temperatures they retain the basic layout of their solid crystalline structure.

In the case of an LCD, the force producing alignment can be as simple as etched grooves or patterns on the front electrode. In its nematic state, the liquid crystal tends to align with these grooves. The grooved plate is normally referred to as the director of the liquid crystal array, as it directs the angle of the crystals.

A simple LCD, such as a watch, uses ambient light reflected off a backplate to display its images. While ambient light is reflected from the backplate, an electrical charge is sent between the two electrodes. The charge is matched to a set pattern, which then becomes the displayed pattern — for a watch it's a figure eight, with seven separate segments. Each segment can be blocked by applying the charge, which means it shows up as black onscreen.

In an uncharged state, light bounces off the backplate and towards the first of two light filters. These light filters also house the electrodes. They are each set at a specific angle. Beyond the first filter are the layers of liquid crystal, all of which twist towards the angle of the second grooved filter. This is typically set at 90° to the first filter. With no charge applied, the light passes out directly.

However, when a charge is applied to the crystals they straighten out. As they no longer align with the second filter, light cannot pass through them. This blocks the reflected light, leading to a black section where the light hasn't reflected outwards. The seven black segments produced in a watch are able to display the numbers 0 to 9.

This is great for a watch, where the necessary images can be created using just seven segments, but it's not practical for a computer screen, which needs many more elements.

Instead of putting component electrodes in set patterns, high-definition LCDs use a setup similar to the Trinitron layout, where a row and column are defined by lines of set electrodes. By defining a given row and column, an individual pixel can be illuminated.

For simple devices such as watches, ambient light is fine. Some come with little bulbs for back-illumination, but they don't use much power. However, a computer screen needs more light available around it. LCD screens are normally backlit for all their lighting needs. This provides a constant level of light (try to read your watch or calculator in the dark), and it allows for precise control of how onscreen light is displayed. By varying the intensity of the light, shading effects can be achieved. This allows for greyscale screens. Current designs allow for 256 levels of intensity, which means 256 shades of grey.

Backlighting has two significant drawbacks. First, it uses a lot of power. The notebook's screen uses more power than any other component. Second, depending on the construction of the screen, the display angle can be severely limited. If you're not directly in front of some of the very cheap screens, you'll see virtually nothing. If you are more than 30° to one side of the screen, a lot of clarity is lost, even on quite good screens and especially in moving images. To make matters worse, a lot of LCDs still use analog connections rather than digital ones. This, combined with the limited viewing angle, means that LCDs can be blurry and difficult to look at.

However, as with CRT monitors, you get what you pay for. A good quality LCD

with a digital connection (such as Apple's Cinema Display) looks significantly better and is easier on the eyes than a poor quality, six-year-old greyscale screen with dodgy pixels.

## Colour LCDs

To understand how colour LCD screens work, let's look at the properties of light. When all the colours of light are combined, white light is produced. If a white light is shined through a filter, the different colours can be separated. Any colour can be achieved, depending on how you filter the light.

As with a CRT monitor, colours on an LCD are produced with red, green and blue filters. Like the liquid crystals, these filters block or allow through their respective colours. The colours can be varied by altering the intensity of the light. This means that 256 shades of red, green and blue can be produced. This makes a staggering 16,777,216 colours possible.



The simplest of these row-by-column LCDs are known as passive twisted nematic displays. These have a twisted molecule pattern and do not control the fading time of individual pixels. In other words, they are passive. Fading time is an important factor in LCD screens. It's the difference between the refresh rate and the rate that onscreen elements move and vanish. For example, if the screen is updated once a second, but onscreen elements take two seconds to fully vanish, slowly fading ghosted images are produced. This is particularly noticeable with moving elements such as mouse cursors, as long trails of ghosted pointers can be left onscreen.

Older and cheaper computer LCDs use passive screens. Passive screens that use SuperTwist Nematic displays (STN) are better quality. Instead of using a 90° twist, STN displays twist molecules between 170° and 240°. Part of the twist is achieved by having a finer director plate and the rest is produced by dissolving an optically active solution into the liquid crystal. SuperTwists can be layered to improve screen clarity and resolution. As each layer is added, so is more detail. Additional twists can be used to remove light spillage between pixels, which can give images a green/yellow tinge.

STN screens are very good, but they can't compete with TFT (Thin Film Transistor) screens that use an active matrix process. Active matrix screens use the same setup of rows and columns, but have an individual transistor over each pixel. These transistors regulate the amount of light coming through to help create the shades of grey or colour. An 800 by 600 display has some 480,000 individual transistors — and that's just for a greyscale screen. If three-colour filtering is used, a staggering 1,440,000 transistors are required. It's a very similar setup to that used in plasma screens (see *APC* December, page 38), but it's cheaper. However, it is more expensive than a comparable CRT screen.

TFT screens allow for a much better response from individual pixels, which improves resolution and redraw. They also consume less power, because each transistor effectively regulates power usage. Consequently, a smaller charge can be used to activate each pixel. Of course, putting thousands of transistors into place is expensive. It also leads to a common complaint: poor screen quality.

## Quality viewing

With 1,440,000 transistors (and most new laptops, capable of 1024 by 768, have considerably more), it's likely that some will fail. The failure rate increases the price of LCD screens, which means fewer will sell. This raises the price even further. Although manufacturing standards or 'tolerances' are set on screen quality, they may not always be adhered to. A single dead pixel is unlikely to stop the screen from working, and if it's in a corner, or appears only when a certain colour is activated, it may not be spotted.

LCD screens are very sensitive to heat, pressure and other environmental hazards like coffee cups. It's not uncommon for a new LCD monitor to have a few funny pixels, and depending on the manufacturer, these may not be covered in the warranty.

One of the side effects of row-and-column screens with an exact number of pixels is that their best resolution is absolutely set. If your screen is 800 by 600, it can't achieve any higher resolution. It is possible to simulate lower resolutions with LCD screens by effectively 'shrinking' the display, thus lowering the actual number of pixels. Some newer LCDs maintain screen size by aggregating pixels, but this can make images appear 'lumpy', depending on the application or game you're running.

In last month's column, we talked about the difference between stated screen size and actual viewable area on CRT monitors. LCDs don't have this problem; there's almost no difference between the stated and viewable areas as there's only a very small outer frame. Therefore, LCD screens usually have viewable areas comparable to CRT monitors one size up. A 17in CRT often has a 15in viewable area, but a 15in LCD also has close to a 15in viewable area, depending on the exact size of the framing bezel around it.

LCD monitor prices have dropped considerably over the last couple of years. This is partly due to improved manufacturing processes and an increase in the number of plants capable of producing them. Consequently, the price gap between LCD and CRT monitors is shrinking. As good LCDs also offer higher quality viewing, they're now a good choice for desktop machines. At present, they're the only option for laptops, at least until other technologies such as cholesteric and plasma displays drop in price.

*Alex Kidman*

Alex Kidman can be contacted at alexk@acptech.net.

For a complete archive of *APC* Technobabble columns, see apcmag.com.

*This month's Core examines the most common PC file systems.*

# Checking the file system

Day after day, your humble file system works overtime to store and retrieve information. Often transparent, except when they slip up and force us to run disk-checking programs, file systems are the key to the organisation and distribution of data on your drive.

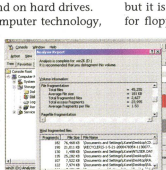
File systems must strike a balance between features and efficiency. This is one area where speed, reliability and features are all crucial, and designing file systems to maximise all of these is an interesting challenge to computer science.

## The nature of file systems

File systems are designed as a practical tool for storing and retrieving information from a storage device. Floppy disks, hard drives, CD-ROMs and DVDs all have file systems. They all need a file system to be able to be used by an operating system. The file system defines how and where information is written to a storage device, so you know how and where it can be retrieved.

File systems come in many forms. They are found on removable media such as CD-ROMs (ISO 9660) and DVDs (Universal Disk Format or UDF), as network file systems such as SMB protocol (Sever Message Block protocol, Windows Networking) and NFS (Network File System, Linux Networking) and on hard drives.

Most aspects of computer technology, from hardware to software, evolve at a rapid pace, but file systems have barely changed. For example, the Windows home consumer platforms, from Windows 95 to Windows Me, still use FAT (File Allocation Table) — an inefficient file system that made its debut with DOS in the 1980s. It's been updated to try to address large volumes (the earliest version of DOS could support partitions no more than 16M), but it remains horribly inefficient for large volumes.



Along with new developments in operating system technology, new file systems have appeared. Microsoft invented NTFS (NT file system) to complement Windows NT, IBM released HPFS (High Performance File System) for OS/2, and Apple designed HFS to work with Mac OS. However, these haven't changed much since their inception. In fact, HFS and NTFS didn't receive an overhaul until just recently.

All modern file systems are designed to support the features of their host operating system. For many, this includes access permissions to files and directories, disk quota limitations for multiuser systems, Unicode support for international languages, long filename support, and file system consistency checking and recovery. In addition, file systems such as NTFS natively support on-the-fly compression and encryption. All of them try to provide these services without compromising space efficiency and performance, and each achieves this with varying degrees of success.

Following is an overview of the PC file systems currently in use, where they came from, and the features they support.

## FAT16, VFAT and FAT32

The FAT file system initially appeared with DOS. It's now out of date, but it is still used in Windows versions up to and including Windows Me. Even Windows NT and Linux can inhabit FAT file systems, but this isn't recommended. FAT is mostly transparent in all versions of Windows, but it is still the predominant file system for floppies, whatever operating system you use.

FAT began as a 12-bit file system (FAT12), but quickly grew to 16 bits (FAT16), the de facto standard. FAT16 addresses larger volumes and can handle partitions of up to 2G. VFAT (Virtual File Allocation Table) was introduced with Windows 95 to provide long filename support for FAT. It did this by using up directory entries to store the extra filename information. This worked, but it had two side effects: DOS could not display the names properly (hence the truncated filenames use a tilde in their titles) and the maximum number of files allowed in a directory was reduced. FAT32 increased the maximum addressable size, this time up to 8 terabytes.

The location of the beginning cluster of a file and its size are stored in the file allocation table. Reading the FAT is simple, which generally means FAT is a fast file system to use. If the volume (and thus the FAT) is very large, or is used in conjunction with applications that require frequent transactions such as databases, FAT is substantially slower.

**Features** Fast on small volumes, poor space utilisation (slack space), susceptible to file fragmentation, no advanced file system features.

## Of trees and diaries

B-Trees, or balanced trees, were introduced by Rudolf Bayer and Edward McCreight in 1972 in their book *Organization and Maintenance of Large Ordered Indices*. The book tackled the problem of how to organise, maintain and quickly search large volumes of related index information — in other words, to design a file system. Normally used in databases, B-Trees are also an efficient method of ordering file system information. There are a number of different forms, including the B+-Tree used in NTFS and the B*-Tree used in ReiserFS.

Journaling (also called logging) has also been used for some time in mainframe Unix-based operating systems such as IRIX and Solaris. In journaling, a transaction log is written for each change to the file system before the change takes place. If the system crashes before an update is complete, the log can be 'played back' at reboot and the changes to the file system completed. Replaying the log file only takes a few seconds, even on multigigabyte volumes. This is a marked improvement on nonjournaling file systems which have to scan the entire volume for errors. One common misconception is that journaling prevents data loss. If data isn't committed to disk before a crash, it will still be lost. However, the file system retains its integrity and remains structurally correct up to the last change that took place.

## Common file system features

| File system | FAT16 | FAT32 | HPFS+ | HPFS | NTFS 5 | Ext2 | ReiserFS |
|---|---|---|---|---|---|---|---|
| **Features** | | | | | | | |
| **Max file system size** | 2G | 8T | 16T* | 2T | 16T* | 16T* | 16T* |
| **Max filename length** | 8.3 | 255~ | 255 | 255 | 255 | 255 | 255 |
| **Access permissions** | No | No | No | Yes | Yes | Yes | Yes |
| **On-the-fly encryption** | No | No | No | No | Yes | Yes** | Yes** |
| **On-the-fly compression** | No | No | No | No | Yes | Yes** | No |
| **Fragmentation resistance** | Very poor | Very poor | Good | Good | Good | Good | Good |
| **Space utilisation** | Poor | Poor | Good | Good | Better | Good | Better |
| **Relative speed** | Very fast~~ | Very fast~~ | Good | Good | Good | Good | Fast |
| **Underlying technology** | File Allocation Table | File Allocation Table | B*-Tree | B-Tree | B+-Tree, journaling | Block/linear | B*-Tree, journaling |
| **Host OS** | DOS | Windows 95/98 | Mac OS | OS/2 | Windows NT/2000 | Linux | Linux |
| **Supported under** | Windows 3.1/95/98 | Windows 3.1/95/98 | Windows 95/98** | Windows NT** | OS/2** | Mac OS** | |
| | Windows NT/2000 | Windows NT/2000 | Windows NT/2000** | Linux | Linux | Windows 95/98** | |
| | OS/2 | OS/2 | OS/2** | | | Windows NT** | |
| | Linux | Linux | Linux | | | OS/2** | |

* Practical maximum, dependent on block size

** Indirectly through add-on programs/patches

~ Uses directory entries to store extended filename information

~~ For small/home sytems; all other file systems far outperform FAT for large volumes

## Macintosh HFS+

The Macintosh Hierarchical File System Plus is the new, feature-rich version of the original HFS. Based on a balanced tree system (see 'Of trees and diaries', page 122), HFS+ supports all the features required of a modern operating system, including Unicode support for international languages. In addition, Mac OS has a unique way of handling file and directory structures, using resource and data forks.

**Features** Resource and data forks (useful only in Mac OS), file fragmentation resistance, file system consistency checking and recovery, space efficiency, long filename support, Unicode support.

## HPFS

IBM's High Performance File System first appeared in a pre-GUI version of OS/2 in 1989. Also a B-Tree-based file system, HPFS offers speed, efficiency and security features for the OS/2 platform. Designed to support corporate applications such as database servers, HPFS comes in two versions: standard and HPFS386. The latter can talk directly to a network card.

**Features** Extended attributes (which are useful only in OS/2), file fragmentation resistance, space efficiency, file system consistency checking and recovery, long filename support, access permission features.

## NTFS 5

Microsoft's answer to HPFS, NTFS was designed to provide all of the features needed by Windows NT, such as security and consistency checking and recovery.

It hasn't changed much over the years, but the release of Windows 2000 prompted an all-new version of NTFS: version 5. It contains a few significant changes, such as hard links and mount points. Hard links are the NTFS equivalent of the symbolic links you find under Linux, but user space tools don't yet exist to create them. Mount points work in the same way with NTFS as with Linux: they provide the ability to attach external file systems to the NTFS's file system tree, seamlessly merging the two file systems into a single file system hierarchy.

**Features** File fragmentation resistance, space efficiency, file system consistency checking and recovery, Unicode support, long filename support, journaling file system, on-the-fly compression and encryption, disk quotas, access permission features.

## Ext2

The Second Extended File System, Ext2, is the standard Linux file system. Ext2 built on the initial Extended File System, which was based on the Minix file system. Ext2 provides all the features needed for a Unix operating system, such as device files, symbolic links, access permissions and file system consistency. Unlike the other advanced file systems reviewed here, Ext2 isn't based on a B-Tree structure. Ext3 is now under development and will improve on Ext2 by adding journaling support. However, ReiserFS might beat Ext3 to the post as the first journaling file system for Linux.

**Features** File fragmentation resistance, space efficiency, file system consistency checking and recovery, Unicode support, long filename support, disk quotas, access permission features.

## ReiserFS

Developed by Hans Reiser, ReiserFS is a relatively new file system that looks promising. Inspired by the potential of B-Tree and journaling file systems, Reiser took the principles of file system design and focused on improving space utilisation, reliability and performance.

The result is a fast, highly space-efficient file system with good consistency and recovery. Currently only running under Linux, it is clearly outperforming Ext2. ReiserFS provides an exciting glimpse into the future, but it is still under development. An excellent overview of file system design can be found on the ReiserFS home page at www.namesys.com.

**Features** Same as Ext2, but with journaling.

The table above summarises the differences and similarities between these popular file systems.

*Ashton Mills*

Ashton Mills can be contacted at amills@acptech.net.

**For a complete archive of *APC* Core columns, see apcmag.com.**

*Design Web sites and interfaces more effectively, and master a range of software.*

# Designs on the Web

## Customer-Effective Websites

This is a practical guide to understanding your customers' needs and translating them into a good Web experience. It is not a step-by-step handbook; rather it's a coach and mentor that will help you make the right decisions and implement the appropriate strategies for your online business.

Focusing on the customer, the book covers customer-effective testing, the e-service requirement definition process and e-service design, development and implementation. It aims to help you create useful Web sites that address real people's needs.

The book includes a range of supporting materials and information: tables, figures, models, screenshots, bullet-point tips, and examples and case studies.




Along with the bibliography, the book includes a useful 'Netography' that lists about 50 sites with good reference material on topics such as user testing, business strategy, Web writing, Web site maintenance and Web marketing.

*Customer-Effective Websites* is recommended for anyone involved in Internet development, from Web developers and content developers through to marketers and dot com executives or, as Dalgleish suggests, "anyone under the gun to produce ecommerce results". The content is not revolutionary, but it helps bring you back to the basics and think about how to create lasting customer value.

*Cathie Kennedy*

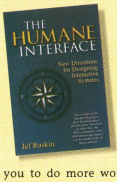
**Author** Jodie Dalgleish
**Publisher** Prentice Hall
**Contact** Pearson
**Phone** (02) 9454 2319
**Price** $64.95
**ISBN** 0130878278
**Rating**

## The Humane Interface

If you design user interfaces, this book will help you avoid some of the more common problems.

Raskin looks to cognitive psychology and ergonomics for help in designing interfaces that are user friendly. Implementing the results of this research requires some major changes to the paradigms underlying current software. A major shift in thinking is required.

Raskin proposes that Asimovian laws of interface design should be considered when constructing an interface. These laws include: "A computer shall not harm your work, or through inaction, allow your work to come to harm", and "A computer shall not waste your time or




require you to do more work than is strictly necessary." These ideas may seem obvious, but we all know that today's systems fall short of these expectations.

Specific recommendations built on these principles include: avoid customisation facilities; avoid adaptive interfaces; and measure, or at least estimate, the efficiency of your design.

Even if you are required to work within an operating system manufacturer's guidelines, *The Human Interface* offers practical suggestions that will make your users' lives easier. It may even give you the inspiration and know-how to deliver something demonstrably better.

*Stephen Withers*

**Author** Jef Raskin
**Publisher** Addison-Wesley
**Contact** Pearson
**Phone** (02) 9454 2319
**Price** $43.80
**ISBN** 021379376
**Rating**

## Allaire Spectra eBusiness Construction Kit

Spectra is a high-end application development tool for experienced ColdFusion programmers. It's very difficult to understand what it does unless you try it out. The product descriptions and marketing jargon that surround it don't make things any clearer.

Fortunately, this book comes complete with a CD containing evaluation versions of Spectra and the ColdFusion server it requires. It's a good reference manual and takes you through installation and configuration step by step — which is necessary for Spectra, as it is not easy to set up.




This book covers everything from the basics right through to building a complete custom application, including a customised Spectra interface. This is very advanced and you won't find it covered anywhere else, not even in the Spectra documentation.

If you are familiar with the ColdFusion language and want to discover what Spectra is all about, or if you are planning to work with Spectra as a development tool, it's well worth the $98.55 price tag. However, be warned: there is not a lot of hand holding in its 855 pages. This book really is just like jumping in at the deep end.

*Daniel Potts*

**Author** Ben Forta, et al.
**Publisher** QUE
**Contact** Kinetics
**Phone** (02) 9976 6611
**Price** $98.55
**ISBN** 0789723654
**Rating**

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Certification courses range in cost from $325 upwards...So if you're serious about investing in your future there's no better way than LearnKey.

### Demand for Skills Escalating

The Australian Information Industry Association estimates that the current skills shortage is 30,000 positions. John Roberts, research director at GartnerGroup, expects that the IT market will grow at the rate of 30,000 per year, which will mean that the skills shortage is expected to continue for the next five to ten years.

*Corporate IT Magazine June 2000*

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"The most in-demand people are those with advanced skills in Windows 2000" stated a recent article in the IT section of the Sydney Morning Herald. Your ticket to the hottest IT career around is to get certified.

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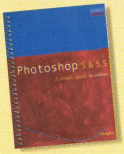
**info@inlearning.com.au**

## Full Screen: Photoshop 5 & 5.5

The subtitle of this book is *A simple guide in colour*, and it doesn't get much simpler than this book. For the beginner, this volume is probably like having an expert talk you through Photoshop's basics.

The layout is quite innovative. It uses a horizontal, ring binder format, so you can lie the book open at the relevant page next to your computer for easy reference. Each page deals with a different topic, and has screenshots and toolbar clips to show exactly what actions are required for each function.

The book's chapters include File, Tools, Filters, Windows and Editing. Each of these is identified with its own colour-coded tab for easy location. Every section deals with the logical application of a particular menu tool or image function. The language is clear and easy to understand. There are click-by-click instructions and samples to explain the processes. The designers have even included shortcut keys in the right-hand lower corner of each page. A helpful paperclip logo appears next to every handy hint.




Despite all these elements, the pages are reasonably uncluttered. The layout is kept very direct and simple, and although you wouldn't want to set up a design business on the basis of this book, it easily puts most manuals in the 'could try harder' basket.

*Jeremy Torr*

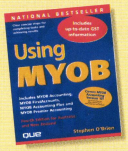
**Authors** Various
**Publisher** Cassell & Co
**Contact** Allen and Unwin
**Phone** (02) 8425 0100
**Price** $35
**ISBN** 1842020374
**Rating** ▮▮▮▮▮▮▮▮▯▯

## Using MYOB

With the advent of the GST, many small businesses switched from paper-based to computerised accounting systems. Those that didn't have learnt the hard way about the Business Activity Statement, and they might now be considering investing a few hundred dollars in a program that will shoulder some of the burden.

Stephen O'Brien has a reputation as one of Australia's leading authors on small business accounting software. The fourth edition of *Using MYOB* covers version 10 of MYOB Accounting, including GST issues. A companion Web site provides updated information, so readers should check it at regular intervals to keep up with any changes.

The book is a clear, step-by-step guide to routine activities. Some sentences may require a second reading, but this is usually due to the characteristics of MYOB rather than a failing of O'Brien's prose. Importantly, he pays attention to business-centred topics such as managing debtors, as well as mundane but essential bean-counting tasks.




The design of the book could be improved to match the quality of the text. The screen dumps aren't nearly as large as they need to be, and the grey column in the outside margins makes it harder to read your own notes.

*Using MYOB* is a helpful security blanket for MYOB beginners, and it may help others decide whether MYOB is right for their business.

*Stephen Withers*

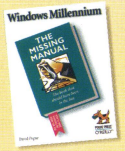
**Author** Stephen O'Brien
**Publisher** Que
**Contact** Pearson
**Phone** (02) 9454 2222
**Price** $42.95
**ISBN** 1740094549
**Rating** ▮▮▮▮▮▮▮▮▯▯

## Windows Millennium: The Missing Manual

Like other titles in the Missing Manuals series, this book assumes little prior knowledge on the reader's part. As a result, those already familiar with Windows 95 or 98 will probably wish the new features were more clearly identified. It isn't a Dummies book, so there are no cute icons, but something that says, 'Hey, this is new — pay attention!' would have been very helpful.

Coverage is thorough, and the book includes a useful section on setting up a home network. This is one of Windows Me's selling points. Scattered throughout the book are valuable tips that you might not otherwise hear about. One of the strengths of this series is the inclusion of useful tips that save time and effort, even for beginners.

The index is extensive, but there were a couple of things that we had to hunt for. For example, if you want to share an Internet connection with other computers, you need to know the name of the feature, as there isn't a reference to it within the 'Internet' entry.




This book provides broad, practical coverage of Windows Me for the beginner. Users of Windows 95 or 98 will also benefit from it, but should probably look for an alternative that more closely meets their needs.

*Stephen Withers*

**Author** David Pogue
**Publisher** Pogue Press/O'Reilly
**Contact** Woodslane
**Phone** (02) 9970 5111
**Price** $39.95
**ISBN** 059600009X
**Rating** ▮▮▮▮▮▮▮▮▯▯

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MGRM0101

*CD-R is now accessible to most PC owners, but will DVD-RAM steal its thunder?*

# Burn to shine

CD writing has hit the mainstream in a big way. As long as you don't multitask at the same time, even basic current model PCs are fast enough to do CD-R and CD-RW without striking data transfer problems.

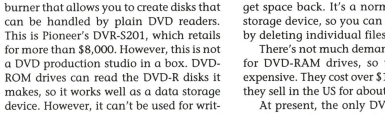
CD-R and CD-RW discs are cheap, and you can get a drive that can write both formats for less than $500, including software and a few discs. As long as you don't use an ancient CD player or CD-ROM drive to read your CD-Rs and CD-RWs, you should have no problems. Even 8x CD writing, which gives you a finished 650M disc in about 10 minutes, can be performed by many current computers.

With CD-R in the bag, attention is turning towards DVD writing.

## Big discs

DVD writing is currently experiencing the same problems that CD-R and CD-RW did in their early days. There are problems with drivers, media compatibility and media interchangeability, and the necessary hardware is very expensive.

It's now possible to buy a DVD-R burner that allows you to create disks that can be handled by plain DVD readers. This is Pioneer's DVR-S201, which retails for more than $8,000. However, this is not a DVD production studio in a box. DVD-ROM drives can read the DVD-R disks it makes, so it works well as a data storage device. However, it can't be used for writing DVD movie disks without the help of other expensive hardware and software. You can write a movie file to the disk, and other computers with DVD-ROM drives will be able to play it, but you can't make a real video DVD.




The DVR-S201 is the first drive to use a full 4.38G disk — the same capacity as a normal single-side, single-layer DVD.

The capacity for disks of this type is usually quoted as 4.7G, but that's stretching the truth. A gigabyte unit is actually made up of 1,024 megabytes, each of which is 1,024 kilobytes. In turn, each kilobyte is 1,024 bytes. Hence, there's 1.074 billion bytes per gigabyte. So 4.7G discs really only have 4.38 gigabytes of capacity if you use standard computer measuring units accurately.

Older DVD-Rs only write 3.68G media, but advertisers used the same mathematical manipulation to label them 3.95G.

DVD-R is far too expensive for most home users. However, a more affordable data storage alternative is developing: DVD-RAM.

DVD-RAM is a rewritable, high-capacity optical disk. Unlike CD-RW, you don't have to erase the whole disk to get space back. It's a normal read/write storage device, so you can reclaim space by deleting individual files.

There's not much demand in Australia for DVD-RAM drives, so they are very expensive. They cost over $1,000 here, but they sell in the US for about $US250.

At present, the only DVD-RAM drives on the market outside Japan are first-generation models which support disks with 2.4 'real' gigabytes of capacity per side (2.6 inflated gigabytes). By the time you read this, version 2.0 drives should be available for less than $1,500.

Version 2.0 drives work with the old 2.6G media, and also with new disks which hold 4.7G per side. These disks have the capacity of a single-sided, single-layer DVD. DVD-RAM drives can read DVDs (and various CD formats), but DVD-ROM drives can't read DVD-RAM.



DVD-RAM discs come in single and double-sided versions, but the single-sided ones aren't very popular. The term 5.2G DVD-RAM disk refers to the double-sided version 1.0 disk. Double-sided version 2.0 discs will be referred to as 9.4G when they become available.

DVD-RAM disks must be in a cartridge to be usable. There are openable cartridges, like the old CD-ROM caddies, for single-sided disks, but all double-sided disks are permanently sealed into their cartridges. Plain DVDs and CDs don't need a cartridge to work in a DVD-RAM drive; the drive tray can also take a bare disk.

As a reasonably fast, random access alternative to tape storage for data that can be bundled into 2.4G chunks, DVD-RAM version 1.0 is a great format. The disks sell for about $70 each, which means they cost about as much per megabyte as the larger capacity IDE hard drives. Version 2.0 blanks will probably be a little cheaper per megabyte. However, the extra cost of the version 2.0 drives means that unless you use a lot of disks, a straight capacity-per-dollar calculation will favour the older drives for a while yet.

For bargain storage, plain old CD-R is still best. Decent CD-R blanks cost less than $2 each. At 650 real megabytes of data per disc, this works out at about a third of the price per megabyte of DVD-RAM.

***Daniel Rutter***

Daniel Rutter can be contacted at dan@dansdata.com.

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# Viewmaster™

# A Screen More than Just Flat




F7EAT

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The Viewmaster F7EAT flat screen monitor with no corner distortion on full-scan display has ultra-high resolution and all functions controlled by an on screen display. The advanced DDC1/DDC2B I/O port provides a convenient plug and play feature for Window 9X/2000 systems.



L5CDS

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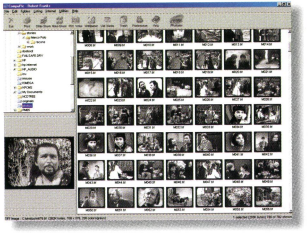
# New age cybermen

Just thinking about that creepy, spine-tingling theme music is enough to bring back fond memories of floppy scarves, metallic mutts and exterminating aliens. *Doctor Who* ended in 1989 after a 26-year run, but since then there's been an explosion in official and unofficial merchandise — everything from original fiction to PC games and audio adventures. I'm pleased to say that I've now made a small contribution to the growing range of unofficial *Doctor Who* memorabilia.

For many devotees, the show's first decade, featuring William Hartnell and Patrick Troughton in the lead role, is remembered with particular fondness. Sadly, many of the episodes from this period are missing. By 1969, 253 episodes had been produced, but 109 have yet to be located. The BBC purged much of its film stocks during the '70s and *Doctor Who* fell victim to the Beeb's desire to dump material no longer considered to have commercial value. How wrong they were!

Fortunately, an abundance of other material, such as photographs, audio recordings and BBC documentation still survives. Thanks to PC technology and meticulous research into the camera scripts, a small group of dedicated fans, including myself, have recreated the missing stories. The reconstructions have even convinced the BBC that a market exists for such material, and they have already released two incomplete stories.

The fan-produced reconstructions are amateur efforts produced with no profit motive and no official distribution, but we like to think that a professional level of care goes into the creative process. These unique compilations have given fans such as myself, who are too young to have seen the original stories, access to a very special period of the show.



▲ CompuPic makes housekeeping easy.

You might be thinking that this endeavour would require costly equipment likely to be found only in TV stations. Actually, most home PCs already possess sufficient power to undertake television reconstructions. Many of my earlier reconstructions were completed on a humble Pentium 90 with 32M of RAM.

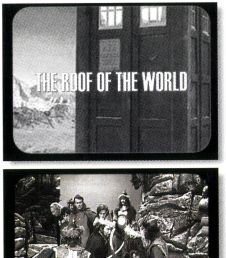
## Photographs

The first step in any reconstruction is to gather together relevant source material. Depending on the quality of the material, some effort may be required to get it into a condition capable of being displayed on a television screen. All the material for the *Doctor Who* reconstructions is over 30 years old, so hours of restoration work is often required before even a single frame of video footage can be created.

Many of the early *Doctor Who* stories were accompanied by an extensive collection of off-air photographs. These were taken by a freelance photographer hired by the BBC to keep a permanent record of the programs. In addition to these photographs, many publicity shots were also taken. Additional pictures taken by set designers, cast and other crew are also available. Unfortunately, due to the age of the material, much of it is afflicted by coffee stains, poor contrast and general wear and tear.

This is where the PC plays a crucial role in the reconstruction process. After the photos and slides are scanned at the highest possible resolution, the resulting images are saved in TIF format. Then, with the help of photo enhancement software such as Adobe Photoshop or Paint Shop Pro, extraneous material is removed from the images. As many of the scanned images contain similar defects, a restoration 'macro' can be created and re-applied to all subsequent scans.

An image management tool for organising the photographic collection is also essential. CompuPic is an excellent package for this job. All images can be managed with the Windows Explorer-style interface, including the ability to view thumbnails. If you're dealing with a reconstruction project with over 700 photos, software like this is crucial just to stay sane!




▲ Typical reconstructed *Doctor Who* slides

## Soundtrack

The other major source of material for the reconstructions is the audio track. Some early *Doctor Who* fans recorded all of the missing 109 episodes onto reel-to-reel audio tape. Considering the staggering cost of blank reels at the time (approximately £2 each in 1965, when the average salary was only £6 per week), these people were obviously very committed to the show.

The audio recordings are a mixed bag in terms of quality. One enterprising fan devised a method to connect the speaker on his TV directly to a tape recorder — not a bad effort for a 15 year old. However, most recordings were produced by holding a microphone against the TV speaker.

Fortunately, all audio soundtracks can be enhanced using sound-editing software. Professional quality equipment is available (such as ProTools, which is used by the BBC's sound restoration expert), but it's too expensive for most of us. However, with perseverance, we've managed to obtain excellent results using smaller packages such as Cool Edit (see *APC* July, page 109). These packages don't cost a mint; Cool Edit 2000 is currently available for $US69.

Audio restoration is an art form in its own right, and an entire article could be devoted to the subject. The two most important factors to be aware of are that affordable software to do this work does exist, and that considerable time and effort may be required to enhance your existing soundtrack. The software removes clicks, background hum and bursts of static, but this takes some time, so be prepared to spend some long evenings in front of your PC.

## Video footage

Apart from photos and soundtracks, another useful source of material is video footage. Although complete episodes have been destroyed, snippets of filmed scenes still exist. Sometimes this is because other television programs have used *Doctor Who* footage. However, in many cases the snippets are amateur recordings made by someone present at the filming, or by an enthusiast aiming a film camera at a television screen (strange as this may sound).

Like the audio recordings, the video footage often needs restoration. For example, the footage sometimes plays at the wrong speed. Ulead VideoStudio can be used to correct this problem (the professional MediaStudio is much too expensive). However, this video-editing software plays a bigger role when it comes to putting the jigsaw together.

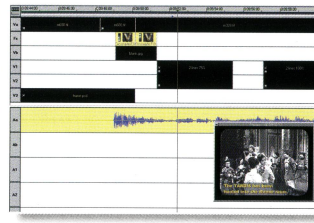
## Other elements

You may be wondering whether suitable material exists for all the scenes that need to be recreated. After all, an average *Doctor Who* episode is nearly 25 minutes long, and some multiple episode stories originally constituted over 150 minutes of material. Because some stories contain a very limited amount of visual material (less than a dozen photographs in some cases), we've had to employ some very creative techniques.



▲ Creating a composite photo: add the character to the set, and voila!

One technique we've developed is the creation of 'composite' images. This involves taking an image from one photograph, such as a character, and pasting it on top of another image, such as a set background. Most graphics packages contain tools for capturing parts of an image, resizing and retouching the image as necessary, and pasting it on top of another. Despite this, considerable practice is required to create realistic composite photos. As I've discovered, a crystal clear character standing in front of a dark, blurry background does not produce a realistic image.



▲ VideoStudio: the engine room for reconstructions

Another technique we've used to enhance a reconstruction are explanatory text captions. A simple text message displayed onscreen for a few seconds can often make sense of a scene which would otherwise be bewildering based on the audio alone. *Doctor Who* is an adventure series, so it features lengthy passages without dialogue. To maintain viewer interest during these scenes, some onscreen text is required. I've also discovered that captions are useful for depicting brief actions, such as characters entering or leaving rooms.

## All together now

Once the individual elements are in place, I then combine them into a single production. This is where video-editing software, such as Ulead VideoStudio, plays a pivotal role. At first glance I thought this software was complicated (with its various 'streams' for video, audio and overlay material), but I discovered it was easy to put together stunning sequences. I've learnt that good editing software should offer more than basic functions such as importing and rearranging source material. It should also provide transition effects from one clip to another (for example, fade to black) and the ability to preview completed work. VideoStudio performs all these tasks.

After my reconstituted episode has been born and turned into a video file (MPEG or AVI), it can be outputted to another medium. The video file is usually incredibly large (for *Doctor Who* episodes, 1.5G to 2G is not uncommon), so the choice is somewhat limited. In the early days, we went for VHS tape over CD-ROM, because CD burners were expensive and hard to come by four years ago. To use video tape, I had to purchase a PC-to-TV encoder box so that the PC signal could be outputted directly to a VCR.

Next, it's time to sit back on the lounge and watch your efforts unfold on the screen (and try not to cringe when a silly mistake is spotted). Viewing the piece of television you have created is perhaps the most satisfying part of all. There's really no limit to the creativity you can use in combining source material, photographs and sound, and awe-inspiring results can be obtained. Not bad for something containing very few moving pictures.

***Bruce Robinson***

Bruce Robinson can be contacted at robinsba@ozemail.com.au.

For a complete archive of *APC* Just DIY columns, see apcmag.com.

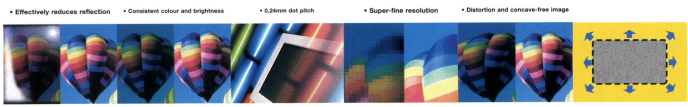
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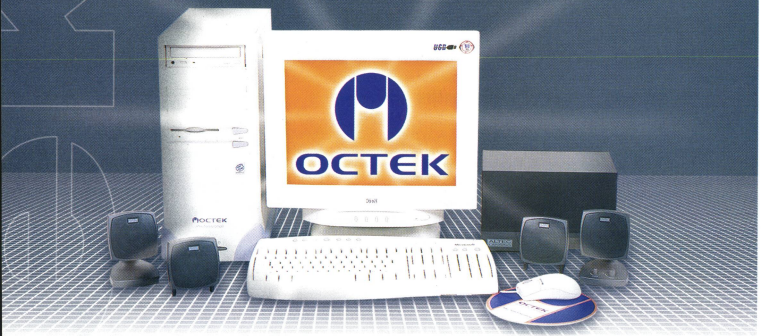
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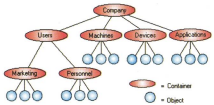
## Windows 2000

Windows 2000 Server's Active Directory is an essential part of the Windows 2000 network architecture, specifically designed for distributed networking environments. It is Microsoft's version of directory services. Like other directory services such as Novell Directory Services, Active Directory is a centralised and standardised system that automates network management of user data, security and networked resources, and enables interoperation with other directories. A *directory* in this sense is not like a folder containing files, but rather a hierarchical structure made up of networked objects. It stores information about all the objects on the network.

Network-based objects include applications, files, printers and users. Active Directory provides a consistent way to name, describe, locate, access, manage and secure information about these resources.

On the most basic level, an Active Directory schema is made up of objects and containers. Objects are the most basic components in the directory, while containers hold objects or other containers.

Each object has one or more attributes, also known as properties. For example, a user has dozens of attributes, such as a first name, last name, email address and phone number. A printer object has attributes such as location and memory. Active Directory allows you to perform very specific queries to locate what you are looking for. For example, you can




▲ A directory is made of objects and containers.

enter a query for a laser printer that can print and staple double-sided, in full colour at 1200dpi and can print at least 12 pages per minute.

In addition to sharing information about network resources and users, Active Directory acts as the central authority for network security in Windows 2000. Active Directory can verify users' identities once and then control their access to all network resources.

## Benefits

The most significant benefit from Active Directory is the reduced cost of ownership for a company, but individual users can also benefit from its advanced search capabilities. Administrators working with large distributed networks also find Active Directory makes life easier and maximises the network's efficiency. Security is strengthened, and the interoperability of different technologies is made easier.

Network management is simplified because Active Directory provides a single point of management for users, applications and devices. As a business adds applications to its infrastructure and hires more personnel, it needs to distribute software to the desktops and manage multiple application directories. Having a single point from which to manage users, groups and network resources, distribute software and manage desktop configurations can significantly lower management costs.

Active Directory strengthens security by providing people with a single network logon. It also provides administrators with powerful and consistent tools to manage security services for all kinds of users. Desktop configurations can be locked to prevent access to specific operations, such as software installation or registry editing. Active Directory also provides built-in support for secure Internet standard protocols and authentication mechanisms such as Kerberos, Public Key Infrastructure and Lightweight Directory Access Protocol over Secure Sockets Layer.

A business could have a number of different directories that need to work together. Alternatively, it could have an existing Novell Directory Service along with directories for email and Enterprise Resource Planning. Active Directory allows you to manage all these directories from a single point.

## Directory terms

Active Directory uses a number of terms to describe the directory schema. Some of the major terms are domains, trees, forests and organisational units.

A domain defines a security boundary. A directory always includes one or more domains, each with its own security policies and trust relationships with other domains. Domains provide numerous benefits in a network. Security policies and settings do not cross from one domain to another and administrative authority for domains can be delegated. This eliminates the need for many administrators with sweeping administrative authority. Domains help structure your network to better reflect your organisation, and a single domain can span multiple physical locations.

You'll often come across the term 'domain controller'. This refers to the Windows 2000 Server machine that installs and configures the components that provide Active Directory services to network users and computers.

## Windows shareware

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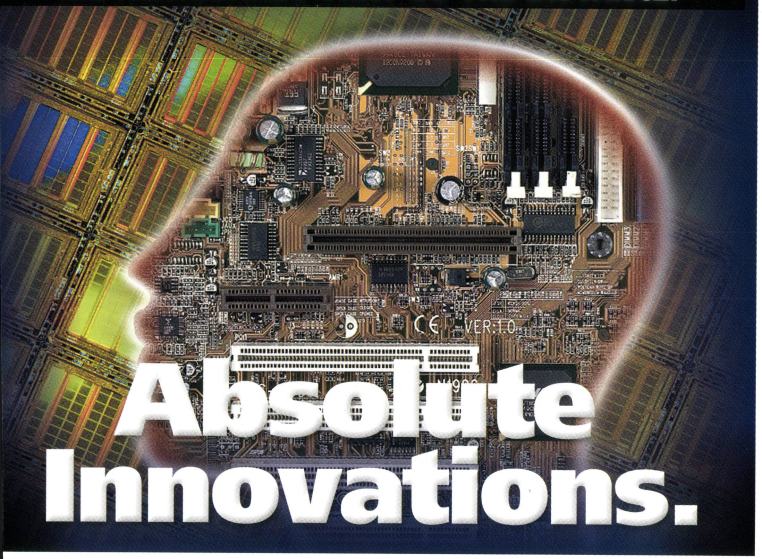
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Domain trees are hierarchical structures made up of multiple domains. The first domain in a domain tree is called the root domain. Additional domains in the same domain tree are child domains. Windows 2000 domains that are arranged in a tree are joined together through two-way trust relationships. A Windows 2000 domain newly created in a domain tree automatically has trust relationships with every other Windows 2000 domain in the domain tree. These trust relationships allow a single logon process to authenticate a user on all domains in the domain tree. However, this does not necessarily mean that the authenticated user has rights and permissions in all domains in the domain tree.

All domains that have a common root domain are said to form a contiguous namespace. The domain name of a child domain is made up of the name of the parent domain plus a unique name for the child domain. In figure 2, child.business.com is a child domain of




▲ A domain tree with two-way relationships

business.com and the parent domain of grandchild.child.business.com. The business.com domain is the parent domain of child.business.com as well as the root domain of the domain tree.

A forest consists of multiple domain trees. The forest root domain is the first domain created in the forest, but naming is not entirely contiguous as with domain trees. For example, instead of having numerous child relationships off the business.com domain, a forest could consist of numerous root domains such as sports-business.com, foodbusiness.com and mediabusiness.com, with child domains independently associated with each one. The root domains of all domain trees in the forest establish trust relationships with the forest root domain.

Using domain trees and forests provides the flexibility of both contiguous and noncontiguous naming conventions. This can be useful in companies with independent divisions that maintain their own domain names.

A particularly useful type of directory object contained within domains is the organisational unit. Organisational units are Active Directory containers in which you can place users, groups, computers and other organisational units. They help minimise the number of domains required for your network.

## Windows 2000 Professional

Active Directory is a Windows 2000 Server component primarily managed on machines with that operating system installed. However, Windows 2000 Professional users can also use the Active Directory to find networked resources. You can search Active Directory for objects such as a printer that prints in colour, a group of users managed by a particular individual, or a shared folder to which a unique keyword has been assigned.

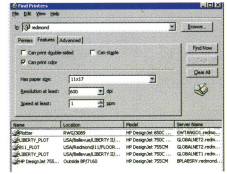
Most searching queries can be performed in the usual ways — from the Search option in the Start menu, or by right-clicking a networked resource. However, some administrative functions require Windows 2000 Administrative Tools, which can be installed on Windows 2000 Professional machines from the Windows 2000 Server CD or made available by your network administrator through the Software Installation Microsoft Management Console snap-in.

With the Windows 2000 Administrative Tools installed you can open Active Directory Users and Computers through the Start, Programs, Administrative Tools menu. To search the entire domain from here, right-click the domain node in the console tree and then click Find.

As mentioned above, Active Directory allows you to find a specific printer to suit your needs. This is a perfect example of how powerful and useful Active Directory can be in an organisation. Instead of looking up the specifications for each printer in the building, you can enter the specific characteristics you need, then all the printers with those characteristics will be displayed.

To use Active Directory to search for Printers, open the Find Printers dialog box by clicking Start, Search, For Printers. The In checkbox allows you to specify whether you want to search the entire directory or to narrow it down to your specific domain. Under the Printers tab, you can enter the Name, Location or Model of the printer you want to find, but often you won't know these details. That's when you have to move over to the Features tab.

Under the Features tab, you can select additional search options that specify features that you need, such as colour, speed, supported paper sizes, whether the printer

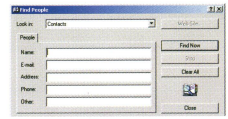



▲ Narrow your printer search by entering specific features.

can print double-sided copies, and whether it can print at a specific resolution. The Advanced tab provides even more criteria to narrow down your search, such as whether the printer supports collation or a specific printer language. After the search is complete, you can open individual printers to view what documents are queued, check the properties of individual printers or connect to a printer which initiates the installation process if it is not already installed.

Of course, printers are not the only resource you can search for using Active Directory. From the Search option in the Start Menu you can search for a user, contact or group. Criteria such as the name of a user's manager, a note describing a contact's special interests, or the name of an individual who is a member of a particular group can be used.

You can use Find Computers to search for computers in Active Directory using cri-




▲ Active Directory makes finding people easier.

teria such as the name assigned to the computer, or the operating system the computer runs on. Once you have found the computer you want, you can manage it by right-clicking the computer in the search results list and then clicking Manage.

When a shared folder is published in Active Directory, you can search for it with Find Shared Folders using a variety of criteria such as keywords assigned to it, the name of the folder or the name of the person managing the folder.

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# Windows 98

One of the most hyped features of Windows 95 when it was released was the Start button, which Microsoft positioned as the main doorway to all the applications on a system. However, the process by which applications are added and removed from that cascading menu is laborious at best. A wizard of questionable utility guides you through the process of locating applications on disk and adding them to the menu.

In Windows 98, the process is a lot easier. Microsoft added the ability to drag-and-drop shortcuts to applications, dialup connections, batch files and virtually any other object that can be represented by a shortcut within Windows.

A right-click allows Start menu entries to be removed, renamed and so on, without having to resort to the time-consuming wizard. This makes it easy to configure the Start menu to contain links to your most important applications, system tools, file folders and the like.

Entries within Start button submenus can be rearranged to your liking by clicking on the entry and dragging it to the preferred position. This facilitates better grouping of menu options into meaningful subcategories, so you aren't stuck with the jumble of vendor names, application titles and meaningless group headers that software so often uses.

If you haven't done so yet, it's a good idea to categorise your programs into subheadings to keep your Start, Programs menu as small as possible. Right-click on Programs, then choose 'Explore' to bring up a split view showing the Start menu tree structure and icons representing each menu item. Double-click on a folder to drill down, and when you get to the right part of the Start menu, right-click on the main window and choose Folder, New to create a new submenu.

Give your new sub-menu a meaningful name, such as 'Games', and drag all the shortcuts to games on your system into that folder. Other good candidates for categories are Internet, System Tools, Productivity Apps, MP3 Tools or whatever you happen to have loaded. If you have quite a few programs of the same type, you can use this technique to create subcategories; for example, Internet, Chat Clients.

Windows Me adds a new dimension to the Start menu, incorporating Microsoft's increasingly common technique of hiding the least-used drop-down and Start menu options to provide a less cluttered desktop. This can be annoying as it's easy to forget where your applications are, but it trims down menus and allows you to locate programs much more quickly, particularly on cluttered systems.

Similar techniques apply to the Favorites folder, in which Internet Explorer stores your favourite Internet sites, file folders and other destinations. Subcategories are the only way to keep tabs on what is for most people a growing number of sites. Using them intelligently can make finding your favourite sites a lot easier and faster.

However, once you've gone to all the trouble of customising the Start menu and Favorites folder, it can be very annoying to have to recreate them later on. This might be the case if you have a system crash and have to reinstall Windows, or if your children make the most of a bit of unsupervised time on the computer. System administrators also face this problem when users mess things up.

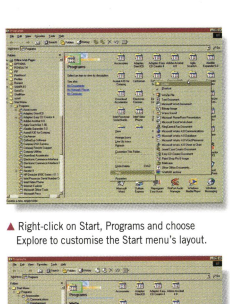
Fortunately, there is a simple way to save the status of your Start menu and Favorites folder so that you can restore them if they become misconfigured. This is possible because both parts of the system are based around the standard Windows file system, which occupies a special space under the main C:\Windows directory. Favorites is contained within C:\Windows\Favorites, while the Start menu is C:\Windows\Start Menu.

Subfolders below the main Start Menu option are located within additional directories, for example, C:\Windows\Start Menu\Programs. Individual programs are represented within this hierarchy as LNK files, which are the individual shortcuts you create on the desktop.

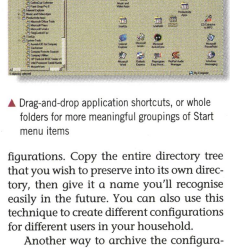
Since both the Favorites and Start Menu entries are based exclusively on the built-in directory structure, you can create backups of both by copying the entire directory structure to another folder. You could create a C:\Favorites Images directory, or even store multiple Start Menu or Favorites configurations. Copy the entire directory tree that you wish to preserve into its own directory, then give it a name you'll recognise easily in the future. You can also use this technique to create different configurations for different users in your household.



▲ A few minutes' customisation produces a dramatically improved Start menu.



▲ Right-click on Start, Programs and choose Explore to customise the Start menu's layout.



▲ Drag-and-drop application shortcuts, or whole folders for more meaningful groupings of Start menu items

Another way to archive the configurations is to use a compression program like WinZip or WinRAR to create a new archive containing the entire directory tree. You can then store multiple configurations in a single directory and double-click on them to restore them to their original positions. Be sure you set the program to preserve the directory structure of individual entries when you archive the files.

When restoring multiple configurations it's important to remember that unless you delete the existing configuration first, you'll simply be adding your archived configuration to the one that's already active. This could just cause more problems. Once you've got at least one archived version of the folder you want, make sure you go to C:\Windows\Favorites or C:\Windows\Start Menu and delete everything there.

*David Braue*

David Braue can be contacted at David@Braue.com.

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*Use multiple commands to enhance and simplify text processing.*

# Processed text

This month, we'll show you how to use multiple commands to process your text. Our first example is a script for counting how many times each word is used within a text file. Our second example is a simple spellchecker.

## Word frequency counter

To count the number of times each word is used in a file, start off by using the tr, sed, sort and uniq commands together ( see figure 1).

We'll use the text of the GNU Public Licence as an example file. You should be able to find a copy of it on your system, probably called COPYING and located in a subdirectory of /usr/doc or /usr/share/doc.

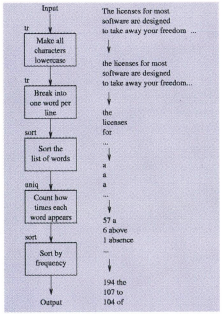



Figure 1: Plan for the word frequency counter

Type locate COPYING or find / -name COPYING to help you find it.

Place the output in consecutively named files so that after running each command you can compare the input and the output files. After the steps are described below, we'll put it together on one command line.

First, change all upper-case characters to lower case so that, words that sometimes begin with a capital letter aren't separated into two categories.

```
tr 'A-Z' 'a-z' < COPYING > COPYING.1
```

The next step is to place each word from the file on a line by itself. Use tr again, this time to translate *nonword* characters (such as spaces, commas, full stops) into new lines. Use the -s (squeeze) option to put one new line between each word, and the -c (complement) option so you only need to specify characters which make up words (the letters of the alphabet, the hyphen and the apostrophe) rather than having to specify every possible nonword character.

To specify a new line as the replacement character, use the special sequence \n. As well as having to specify an apostrophe as a word character, this makes the shell quoting for this command tricky. In the example below, a backslash is used to quote the apostrophe, and apostrophes to quote \n.

```
tr -cs A-Za-z\'- '\n' < COPYING.1 > COPYING.2
```

Your original file is now broken up so that there is only one word per line. Use the command below to sort the file so that identical words are next to each other.

```
sort < COPYING.2 > COPYING.3
```

The uniq command with the -c (count) switch will count the number of times each word is used.

```
uniq -c < COPYING.3 > COPYING.4
```

Instead of sorting the list by word, make it more useful by sorting by how many times each word is used. The -r (reverse) switch in the command below will place the most often used words at the top.

```
sort -r < COPYING.4 > COPYING.5
```

All of the above will produce the following command line.

```
tr 'A-Z' 'a-z' < COPYING | tr -cs A-Za-z\'- '\n' \
| sort | uniq -c | sort -r
```

To create a shell script to make this command line easier to run in the future, save these two lines in a file.

```
#!/bin/sh
tr 'A-Z' 'a-z' | tr -cs A-Za-z\'- '\n' | sort | uniq \
-c | sort -r
```

Type chmod +x wordcounter to make it executable, and place it in a directory in your path such as /usr/local/bin. Then, just type wordcounter COPYING to run it.

## Glitches and improvements

The word counter works well, but there are a few glitches. You can improve on your command line.

In our example document, the double hyphen is used as a dash to separate words. However, our command line treated the hyphen as a word character. In the sentence containing "...mouse-clicks or menu items--whatever suits your program", "items--whatever" was treated as one word.

Apostrophes cause another glitch. The command line also treated them as word characters, even when they were used as quote marks around a word.

Some words are used more commonly than others (such as 'the', 'and' or 'it'), so you might choose to not display a particular list of stop words. Similarly, if you're only interested in overused words, exclude from the output any words that were only used once or twice.

## Spellchecker

Figure 2 shows the plan for the spellchecker. The first two steps are the same as for the word counter, so they're combined in the command below.

```
tr 'A-Z' 'a-z' < COPYING | tr -cs A-Za-z\'- '\n' \
> COPYING.1
```

Next, create a sorted list of words for checking. To eliminate duplicates, use the sort command with the -u (unique) switch.

```
sort -u < COPYING.1 > COPYING.2
```

The dictionary we'll use (/usr/dict/words, or /usr/share/dict/words) has no single-letter words, so remove those from your list.

```
grep -v '^.$' < COPYING.2 > COPYING.3
```

The dictionary contains some capitalised words. Use the following command to make a lower-cased version of the dictionary.

```
tr 'A-Z' 'a-z' < /usr/share/dict/words | sort >\
wordlist
```

Finally, to use comm to find the words that are in your file but not in the word list, type comm -23 COPYING.3 wordlist.

The -23 switch tells comm that you only want to see words that are in the COPYING.3 file and not in the wordlist file. If you

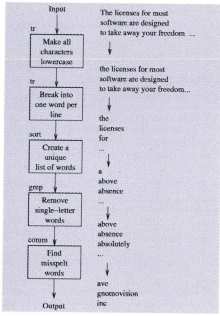



Figure 2: Plan for the spellchecker

put your spellchecker onto one command line, you end up with the following.

```
tr 'A-Z' 'a-z' < COPYING | tr -cs A-Za-z\'- '\n' \
| sort -u | grep -v '^.$' | comm -23 - wordlist
```

Using a dash (-) as the first argument to comm tells comm to read from standard input. Most Linux command line utilities implicitly read from standard input, but because comm needs to read from two files, you must specify standard input.

## Adding context

The list of incorrect words you produced is useful, but the ability to view some context around the incorrect words would be even better. To do this, place the list of misspelt words into a file and use grep to search the original file for them. You also need to remove the blank line that will most likely be in your misspelt word list by using grep in this command.

```
comm -23 COPYING.3 wordlist | grep -v '^$' \
> badwordlist
```

With the -f badwordlist argument (-f stands for file), grep can read the list of misspelt words and use each line as a search string. You also need to use the -i switch to ignore case and the -w (whole words) switch so that correct words containing elements that have been identified as misspelt words aren't listed.

```
grep -f badwordlist -wi COPYING
```

For more help finding misspelt words, use the -n switch to grep to print line numbers.

To improve your displaying of context even further, put a marker such as a series of star characters (*) around each misspelt word. Do this by turning your word list into a sed script which will place *** on either side of the misspelt word.

Last month, the sed examples were single commands such as s/search/replace/g. However, sed can also read a file with a list of instructions. If 'ave' and 'gnomovision' were misspelt, a file with these instructions will do what you want.

```
s/\<ave\>/***&***/gi s/\<gnomovision\|\>\
/***&***/gi
```

The \< and \> elements in these expressions tell sed to find whole words only. The ampersand (&) is a special character that is replaced with whatever the search string matches (in this case, ave or gnomovision). The g option on the end tells sed to replace all instances of the search string that it can find (otherwise it will only replace one per line), and the i option tells sed to ignore case when searching. To turn your list of misspelt words into a list of sed instructions, you can use sed itself.

```
sed's\(.*\)\s\|\<\<\>\1 \|\>/***\&***/gi" <\<> \
badwordlist > sedscript
```

You need several backslashes to prevent the sed command you're trying to print from being interpreted as a sed command immediately. Three double quote marks are used instead of three slashes to separate the search string from the replacement. It's customary to write s/search/replacement/, but you can use double quote marks — s"search"replacement".

To use the new sedscript file, you can type and run sed -f sedscript < COPYING. All the spelling mistakes in the COPYING file will be highlighted with asterisks. If your file doesn't contain many errors, you might not want to see the whole file. In this case you can use grep to display just the lines with misspelt words, as below.

```
sed -f sedscript <\<> COPYING | grep '\*\*\*'
```

An even better solution would be to use the -A (after) and -B (before) options, so that grep can give you one line of context around each misspelt word.

```
sed -f sedscript <\<> COPYING | grep -A 1 -B \
1 '\*\*\*'
```

For a complete archive of *APC* Linux columns, see apcmag.com.

## Linux freeware

### FreeAmp

This is a simple and elegant audio player with little system overhead and a variety of good-looking skins.




### GnomeICU

An ICQ client for Linux, this is fully compatible with Mirabilis ICQ.

### MainActor

This is a professional multimedia processing suite which captures, composes, edits and sequences film.

### phpGroupWare

This database-driven groupware Web application features email, calendar, to-do, chat, forums and fax services.

### PHP-Nuke 4.0

This brilliant portal toolkit allows you to create powerful sites with many features.

These programs and more can be found on this month's cover CD, along with more detailed reviews.

## Improving the spellchecker

The spellchecker has similar problems to the word counter with apostrophes and double hyphens, but they can be fixed.

The dictionary used in our example is another problem. It doesn't include words ending with a possessive apostrophe and the letter s ('s). You can remove this ending from any words in the input document, but it must be done before sorting the list words, otherwise comm will not work correctly.

It would be relatively easy to implement a shell script to automate the checking of a document, and allow a personal dictionary with additional words to be specified.

*Geoffrey Bennett*

Geoffrey Bennett can be contacted at geoffrey@netcraft.com.au.

*Enhance the flexibility of your Palm by installing system hacks.*

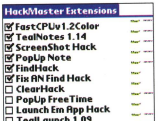
# Hacking your handheld

The Palm operating system was designed to be light and efficient to minimise processor and memory requirements. It has proved to be a solid foundation for all Palm products and there are no significant differences between the early releases and the current 3.52 version.

This has limited the flexibility of the Palm OS, so to get around some of these issues 'hacks' have been developed. Hacks integrate with the basic Palm OS and extend the Palm's built-in features. They tend to be unobtrusive and act as if they are a part of the system. Hacks do not appear as standard Palm programs and require a shareware program called HackMaster (www.daggerware.com) to activate and manage them.

## Managing hacks

HackMaster is the most popular application for managing hacks. It allows you to toggle them on and off, select various options, register them and select the order in which they run. It has become the de facto standard for managing system hacks and developers have written hundreds of freeware and shareware hacks to run with it. Many are free, and shareware prices range from $US5 to $US15 and can usually be used even if you don't register them. There are a few commercial hacks written by companies such as TealPoint Software (www.tealpoint.com) that have more sophisticated features.




▲ Use HackMaster to manage your hacks.




▲ Use Launch 'Em App Hack to pop-up menus.

FindHack adds options to the find button (perso.wanadoo.fr/fpillet), ClearHack removes the lines on your memos(www.quartus.net/products/clearHack), Launch 'Em App Hack pops up various menus with the stroke of a pen (www.synsolutions.com/software/freeware), and TealNotes makes colour drawings and diagrams within your memo pad, task or calendar notes (www.tealpoint.com/softhome.htm). The options are almost endless, and new system hacks are being released every month. These allow you to customise your Palm to meet your personal requirements and use it more efficiently.

## The desk accessory hack

One popular type of hack is the desk accessory or DA hack. There is some confusion about the relationship between hacks and DAs because some work independently of a management console. There is no difference between a DA and a hack, and some PDA developers would like to see all hacks relabelled and rewritten as DAs to eliminate confusion. They also want to develop an industry standard.

DA hacks are compatible with HackMaster and in most cases they are free or very inexpensive. They can be very useful. Palm OS is not really a multitasking operating system like Windows, so you can only perform one task at a time. For example, if you're in the datebook application and want to look up some data in your memo application, you must switch to the memo application, find the information, and then go back to the datebook application. A desk accessory such as PopUp Note (www.benc.hr) allows you to access your memos without closing the application that is currently open. Most DAs work in a similar way, giving you quick access to information with a pen stroke, combination of button pushes or shortcut command. They tend to be very small and perform simple tasks.

Launch 'Em App Hack is a DA hack. It allows you to instantly jump to the last application used and pops up a quick list of all applications installed on your Palm.

Desktop accessories were initially developed in Japan, and although many of the more common Palm Web sites such as Palm Gear H.Q. (www.palmgear.com) have many desk accessories, the most impressive collection can be found at a Japanese site called Cute & Funky DAs (member.nifty.ne.jp/yamakado/da).

## Hack troubleshooting

Occasionally, a recently installed hack will interfere with one that's already on your Palm. If this happens, change the order in which they start up. Hacks can

## PDA Shareware

### Cyber Man 2.0

A modern Pac-Man, this fast-paced action game has great 3D effects and good sound effects.

### Primer PDF Viewer

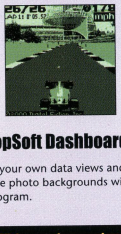
This 30-day demo allows you to view Adobe Acrobat files on your Palm or Pocket PC.

### Pocket Nav

Move quickly between open applications and close applications not in use.

### Race Fever

This is an excellent 3D racing game for the Palm.




### SnoopSoft Dashboard

Set up your own data views and multiple photo backgrounds with this program.

**All these packages and more can be found on this month's cover CD, along with more detailed reviews.**

## Making ebooks on your Pocket PC

The Pocket PC displays ebooks more clearly and easily than any other PDA technology. These ebooks use a revolutionary technology called ClearType that displays crisp sharp text on your PDA. You can make notations and drawings in your eBooks and instantly jump to any marked place within the book.

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Creating your own ebook is simple. As a minimum, you need ReaderWorks Standard, but it's a good idea to put Microsoft Reader on your PC to preview the books you create. Once installed, take your document or public domain text and put it into HTML format. If it's from a Web page, select the File menu from Internet Explorer and click on Save As to save the HTML file onto your hard disk.

If you want to convert an existing Microsoft Word document to HTML, bring the document up in Word and select Save as Web Page from the File menu. It's a good idea to open the document in Word even if it was downloaded from the Internet so you can select the sections of the document you want to put in the table of contents. Do this by changing the style of your reference points to one of the headings available in Word. If you don't have the option to save as HTML, you may need to install the HTML support option from your Microsoft Office installation CD.

Once the document is converted to HTML, open ReaderWorks and click OK to create a blank ReaderWorks project. Next, press Add and select the HTML document you created or downloaded. Next, select Properties and enter any information you want your book to contain such as publisher, author, description, date, and so on. Finally, go to the Table of Contents tab and create your table of contents for quick reference. If you've used styles and headings in your Word or HTML document, the wizard will automate this. Now save your ReaderWorks project so you can modify it later, and start the conversion process by clicking on the Build ebook button on the upper right side of the button bar.

If you use Word 2000, you can install Microsoft's Reader Add-In for Word 2000 from www.microsoft.com/downloads to create ebooks. It doesn't allow you to customise your document as the ReaderWorks program does, but it's very easy to use. Converted documents can have text, paragraph formatting, page breaks, simple tables, footnotes, bullet lists and graphics in JPG, GIF, PNG, BMP and TIFF formats.

Use Word styles to make sure the text is consistent and gets converted properly, and try to use ClearType fonts such as Berling Antiqua, Frutiger Linotype or Lucida Sans Typewriter. Other fonts are supported, but don't look as good on your Pocket PC. Graphics and tables might not convert perfectly and it could take more than one try to get them correct. The formatting changes slightly during the conversion process.

Once the document is ready for conversion, left-click on the new reader icon that is located in the Word 2000 toolbar between the Printer and Print Preview icons. The converter then asks you if you want to continue and save your work prior to starting the conversion process. At this point, you can choose the ebook title, author, filename and storage location. It can be automatically installed in the ebook library on your Pocket PC or in the library on your desktop computer. If you want to install it on your desktop, drag it to the My Documents folder that corresponds to the device folder on your Pocket PC.

Now send the ebook to your Pocket PC the next time you synchronise, and run the ebook reader to open it up.

be started or stopped at any time, and they start up in the order in which they've been selected. If your Palm gets reset for some reason, you can start all the hacks at once or turn them off to troubleshoot problems by starting them up one by one.

Your Palm can lock up if you attempt to install or update a hack that has already been installed and is active. If this happens, do a hard reset by inserting a paper clip or unscrewing the top of your stylus and inserting the plastic reset tab into the reset button on the back of your Palm. Once restarted, you'll be asked 'Would you like to reinstall your formerly active collection of system Hacks?'. If you are having problems with your hacks, it's best to select Cancel rather than to reinstall them. This allows you to test each hack individually.

You can also experiment with the order in which the hacks are being loaded, in case one hack is preventing another from working properly. If you just installed an updated hack and your Palm locks up, delete the old hack by tapping on the applications icon in the top left corner of the silkscreen, tap the menu button just below the application button, and select Delete. Find the hack you're attempting to update and remove it.

Don't let this advice discourage you from using hacks. They are relatively trouble-free and can provide almost unlimited flexibility in the everyday use of your Palm.

If you are interested in creating your own hacks, either for personal use or to distribute as shareware, APIs (Application Programming Interfaces) and programming tips are available from www.daggerware.com/hackapi.htm.

*Ronald Rosenbaum*

**For a complete archive of *APC* PDA columns, see apcmag.com.**

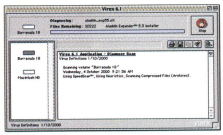
**Ronald Rosenbaum can be contacted at ron@ats.au.com.**

*Sometimes standard Mac system utilities can do with a little third-party help.*

# The sharpest tools

Some people find Mac OS and a copy of AppleWorks all the software they need, but there's no doubt that a modest toolkit of utility software can make life easier for those with more demanding tasks. These tools can help to head off problems before they arise, or make a better job of cleaning up the mess. Other utilities can help open files sent to you by people using other software, or streamline routine operations.

## Virus protection



▲ Install an antivirus product and keep it up to date.

Destructive viruses aren't very common in the Macintosh world. One of the most widespread problems are macro viruses. It's virtully unknown for them to damage Macs as they generally target Windows-specific files and directories, but Mac users can spread them, so an antivirus product is a useful tool.

If you install one, you need to keep the virus definitions up to date. Monthly updates are necessary, sometimes augmented with intermediate releases to deal with particularly virulent outbreaks.

## Disk utilities

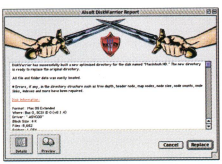
Sometimes the information used by Mac OS to track what's where on a disk gets scrambled. That is when a product like Disk First Aid is useful. Recent versions are more capable than their predecessors, but they aren't able to detect and repair as wide a range of disk damage as third-party utilities such as Symantec's Norton Utilities for Macintosh (NUM), Alsoft's DiskWarrior, or Micromat's TechTool Pro.

DiskWarrior and TechTool Pro create a completely new directory, whereas Disk Doctor patches up the old one. Building a new directory is relatively fast, and risks can be reduced by selecting DiskWarrior's option of remounting the volume using the new directory before it is written to the disk. This allows DiskWarrior to copy essential files to another disk before any permanent changes are made, so a second attempt at recovery is possible. Using this feature means you need never be disadvantaged using DiskWarrior. Other disk utilities have been known to compound the damage under certain circumstances.

DiskWarrior also provides an extension that checks the data being written to or read from the directory. This reduces the risk of corruption and gives early warning when it has occurred. It also ensures directory updates are immediately written to the disk, minimising the chance of losing data as a result of power failure or a crash.

A copy of PlusOptimizer — Alsoft's disk defragmentation and file rearrangement program — is included with DiskWarrior. Opinion is divided over the need for regular defragging, but it seems that its benefits are less noticeable with current disk and overall system speeds. Despite this, it can be worthwhile keeping a drive optimised if you use it to store iMovie or other video-editing projects, or as the source for burning CD-Rs.

NUM also includes a disk optimiser, Speed Disk, that can reorganise files to suit different purposes such as partitioning a disk or burning a CD-R. The package also includes a control panel that tracks files as they are created, changed and deleted. It stores information that gives Disk Doctor and other components of the package a better chance of recovering files in the event of problems. The Internet-based LiveUpdate feature, common to other Symantec software, automates the process of checking for, downloading and installing any updates that are released.



▲ Regular use of a disk repair utility such as DiskWarrior can stop damage from snowballing.

## Mac OS shareware

### DesignWorkshop Lite 1.8.5

A free 3D modeller, it can generate fully-textured and realistically-lit models, then allow you to walk through them.

### Drop Drawers 1.2.6

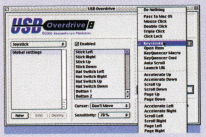
This Finder enhancement integrates NotePad, ScrapBook, Launcher, URL Manager and other functions.

### Interarchy 3.8

A comprehensive set of Internet and IP network tools, it allows you to group Internet functions to suit your needs.

### PageSpinner 3.0

A capable HTML editor for those who prefer not to use WYSIWYG editors, it helps with many HTML functions.

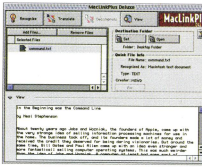


### USB Overdrive 1.3.7

This universal USB input device driver can configure just about any joystick, mouse, tablet, trackball or gamepad.

**These programs and more can be found on this month's cover CD, along with more detailed reviews.**

Several utility packages go beyond disk repair and optimisation. NUM includes tools to unerase files and to recover from inadvertent reformatting. It can erase files and unused space that is beyond hope of recovery. It also has benchmarking, a find utility and a control panel that puts a small icon in the menu bar to show when disk activity is taking place.




▲ MacLinkPlus is handy for opening files created by applications you don't own.

TechTool Pro includes antivirus facilities, checking for software conflicts, repairing PRAM errors and checking for a variety of hardware subsystems.

## Compression and translation

StuffIt Expander is a free utility that allows you to access StuffIt, Zip, BinHex and certain other archive and transmission formats. For years it has been a de facto standard for compression on the Mac. There's a good chance that you've already got a copy of StuffIt Expander, as it comes with Mac OS and some other popular software. However, it's worth checking Aladdin's Web site for the latest version to ensure compatibility with the current release of DropStuff (Aladdin's free shareware compression utility) and the full StuffIt Deluxe package.

StuffIt Deluxe allows you to work with almost all common archive and transmission formats. You can also work with StuffIt archives as if they are folders.

Version 5.5 has several new features, including tighter compression, the ability to create archives that are self-extracting on a PC, Zip compression and a tool for irreversibly deleting files.

If you've accessed the files you've been sent, but don't have the application that created them, Mac OS's File Exchange control panel can help map files to appropriate applications, or open a document within a suitable program.

Imagine you want TIFF files originating from Windows to open in Photoshop rather than the default PictureViewer. Open File Exchange from the Control Panels submenu of the Apple menu, and click the PC Exchange tab. Scroll down to the tif/PictureViewer entry and double-click on it. In the resulting dialog, scroll back through the Applications list until you find Photoshop, then click the Change button. Close File Exchange and the job's done.

Alternatively, you might want to override a Macintosh document's creator code, which associates the document with an application. Most ReadMe-style files are SimpleText documents, but they are sometimes BBEdit files. If you don't use BBEdit, an annoying File Exchange dialog appears each time you try to open these files. To have BBEdit files automatically open in SimpleText, click on File Exchange's File Translation tab. Click the Add button, then navigate to a BBEdit file and click the Continue button. In the next dialog, scroll through the list of applications until you find SimpleText, click it and press OK.

If you don't have an application that can handle this type of file, you need a tool such as DataViz's MacLinkPlus Deluxe. This program translates files from one format to another. For example, Version 12 can create a Microsoft Word 98 equivalent of an AppleWorks 6 document, preserving almost all of the formatting.

The dominance of Microsoft in the PC and Mac office applications market, and the prevalence of Internet-related formats, means MacLinkPlus is not essential these days, but it saves a lot of time and effort when it is needed. Unfortunately, DataViz drops what it describes as 'out-of-date translators' such as the original MacWrite and Ventura Publisher. They're not the sort of files you come across every day, but if you ever need these translators the documents concerned are likely to be very important to you.

## Automation

If you find yourself continually repeating the same set of operations, consider learning about the macro facilities provided by the application, or look for AppleScript support.

Alternatively, try an automation package such as OneClick, QuicKeys or KeyQuencer. These allow greater flexibility than AppleScript, yet integrate with Apple's scripting system. For example, you might want to create an AppleScript to switch to the Finder and hide all other applications. You can't record an AppleScript to do the job, but a utility such as OneClick can record your actions and create a macro with minimal effort. Of course, there's a lot more to these programs. For example, OneClick's Launch Strip is a convenient and unobtrusive way of opening regularly used applications, folders and documents, and the PopupDir feature will quickly select frequently used folders in open and save dialogs.

### Mac tools and utilities

**StuffIt Expander**
**Distributor** Aladdin Software
**Online** www.aladdinsys.com

**KeyQuencer**
**Distributor** Binary Software
**Online** www.binarysoft.com

**QuicKeys, QuicKeys Demo, MacLinkPlus Translators**
**Distributor** Conexus
**Online** www.conexus.com.au

**Virex, StuffIt, Conflict Catcher**
**Distributor** Deluxe Pica Software
**Online** www.pica.com.au

**Sophos Antivirus demo**
**Distributor** Sophos
**Online** www.sophos.com.au

**Norton AntiVirus for Macintosh, Norton Utilities for Macintosh**
**Distributor** Symantec
**Online** www.symantec.com.au

**TechTool Pro**
**Distributor** Techtools Australasia
**Online** www.techtools.com.au

**OneClick**
**Distributor** WestCode Software
**Online** www.westcodesoft.com

## Extensions management

Mac OS's Extensions Manager control panel is useful, but you'll get greater control with Casady & Greene's Conflict Catcher.

Conflict Catcher can track down software conflicts that cause crashes, freezes or other malfunctions. It's particularly useful for people who install many different pieces of software, and are likely to experience a conflict. Its ability to control the contents of any folder means it can also be used to set up Macs for different conditions or purposes. PowerBook users can arrange for the automatic selection of different startup sets when running on battery or mains power. Conflict Catcher sets can even tell Location Manager which configuration to use.

*Stephen Withers*

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For a complete archive of APC Mac OS columns, see apcmag.com.

*Take a closer look at error handling in C++.*

# Exceptional circumstances

Last month, we took a quick look at C++ exceptions. This time, we explore their intricacies in more detail.

Listing 1 shows a simple use of exceptions. The code is enclosed in a try block, and the exception handling code is enclosed in a catch block. If an exception is 'thrown' from inside the try block, or from a function called from inside the try block, the exception is 'caught' and handled by the catch block. This sounds simple enough, but there are a few things to bear in mind.

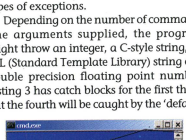
First, you are not restricted to throwing character strings only. You can throw any data type. Listing 2 throws a variable x of type X, and tries to catch it as type Y. This will be successful if at least one of the following are true.

- x and y have the same type (X is the same as Y)
- Y is a base class of X
- X and Y are pointer types, and rule 1 or 2 holds for the types to which they point
- Y is a reference, and rule 1 or 2 holds for the type to which it refers

If an exception is not caught, the program will terminate with an error message — usually Uncaught Exception or Abnormal Termination.

The second issue is that you can have several different catch blocks to catch different exceptions. This makes good sense, as you might want to throw many different types of exceptions.

Depending on the number of command-line arguments supplied, the program might throw an integer, a C-style string, an STL (Standard Template Library) string or a double precision floating point number. Listing 3 has catch blocks for the first three, but the fourth will be caught by the 'default' catch block. This is declared catch(...)|| and will catch any type of exception.




▲ Output from except.ccp compiled with MS VC++6.0

If you have multiple catch blocks, more than one could be capable of catching a particular exception. Therefore, the order in which the catch blocks are declared is important. The first matching catch block is used, even if there is a better match further down. If you don't get the order right, you could have a catch block which can never be reached. Listing 4 contains a simple example of this and listing 5 provides a more subtle example.

## Classy exceptions

The C++ STL defines an exception class called 'exception'. This class has one method, what(), which returns a character string describing the type of exception that has been thrown. The exception class is not intended to be used directly, but to act as a base class for various types of exception.

Listing 6 illustrates some exception techniques. The function memtest() is designed to cause new to fail. It is the standard memory allocation device (see APC September 1999, page 157). The bad_alloc class is a derived class, with exception as its base. It is defined by the STL.

The function casttest() generates a different type of exception. If you dynamic_cast an exception object to a class derived from the exception class, the cast fails and a bad_cast exception is thrown. The bad_cast class, like the bad_alloc class, is an STL class derived from the exception class.

The filetest() function does things differently. It defines its own error class: bad_file. When the file doesn't open, it throws its own exception. The bad_file class overrides the what() method inherited from exception.

The main() function calls each of the functions in turn and catches the appropriate exceptions. As each of the exception classes is derived from the base exception class, the single catch block may be used to catch all the different exception types. If you need to handle one type of exception differently, you can create a catch block for it.

## Different strokes

There are three ways to catch an exception class: by pointer, by value and by reference as follows.

1. catch(exception *e)
2. catch(exception e)
3. catch(exception &e)

Catching by pointer (form 1) can be tricky. In listing 7, the function func1() throws the address of a local variable. Before the exception can be caught, the function is terminated and the local object destroyed. The catch block receives a pointer to memory that is no longer valid, and the results can prove ugly and painful.

The function func2() allocates a new object and throws that. The catch block receives a valid pointer, but now the catch block must delete that pointer. This raises the possibility of a memory leak. It's generally good to avoid throwing exceptions with pointer arguments.

If you use the model of func3() and pass by value, the compiler makes a copy of your object and deletes the copy when you're finished with it. This is potentially slower, but much safer. By definition, exceptions shouldn't be common (otherwise they're not exceptions), so safety is generally more critical than the speed. Catching by reference tends to be more efficient.

These basic examples of how to throw exceptions illustrate a good style of exception handling. Until next month, keep on coding.

*Michael Smith*

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## Exceptions and new

The ANSI ISO C++ standard says that when new is unable to supply the requested memory, it should throw a bad_alloc exception. Older C++ documents prescribed that new should simply return NULL. Many of our current compilers don't adhere to this portion of the standard. Of the three compilers I tried, only Borland C++ Builder 5.0 behaved correctly. Microsoft Visual C++ 6.0 returned NULL. DJGPP (DOS port of GNU GPP 2.9.5) threw an exception, and it appears it might be a bad_alloc exception. We say 'appears', as bad_alloc is not defined in any of the header files, so a bad_alloc exception can't be caught explicitly.

For a complete archive of APC C++ columns, see apcmag.com.

# C++ source code

**Listing 1**
```
void func()
{
  try {
    do_something();
    if (error_contition)
      throw "Some error";
  }
  catch (const char *msg) {
    handle_error(msg);
  }
}
```

**Listing 2**
```
int main()
{
  X x;
  try {
    throw x;
  }
  catch(Y y) {
    // etc.
  }

  return 0;
}
```

**Listing 3**
```
#include <iostream>
#include <string>
using namespace std;

int main(int argc,
    char *argv[])
{
  try {
    switch (argc) {
    case 1:
      throw 1;
    case 2:
      throw "Two";
    case 3:
      throw string("III");
    default:
      throw 4.0;
    }
  }
  catch(int i) {
    cout<<i<<endl;
  }
  catch(char *p) {
    cout<<p<<endl;
  }
  catch(string &s) {
    cout<<s<<endl;
  }
  catch(...) {
    cout<<"Unknown"<<endl;
  }

  return 0;
}
```

**Listing 4**
```
#include <iostream>
using namespace std;

int main()
{
  try {
    throw "XXX";
  }
  catch(...) {
    cout<<"Unknown"<<endl;
  }
  catch(char *p) {
    cout<<p<<endl;
  }

  return 0;
}
```

**Listing 5**
```
#include <iostream>
using namespace std;

class Base {
public:
  Base(int i)
    : ib(i){}
private:
  int ib;
};

class Derived : public Base {
public:
  Derived(int i, int j)
    : Base(i)
    , id(j){}
private:
  int id;
};

int main()
{
  try {
    throw Derived(1,2);
  }
  catch(Base b) {
    cout << "Base" << endl;
  }
  catch(Derived d) {
    cout << "Derived" << endl;
  }
  return 0;
}
```

**Listing 6: Except.cpp**
```
#include <iostream>
#include <fstream>
#include <exception>
#include <climits>
using namespace std;

class bad_file :
      public exception {
public:
  virtual const char *
  what() const
  {
    return "File Exception";
  }
};

void memtest()
{
  const size_t size=INT_MAX;
  char *p = new char [size];
  if (!p) {
    cout <<
      "Non-standard new!"
      << endl;
    throw bad_alloc();
  }
}

void casttest()
{
  exception e;
  bad_cast &b =
    dynamic_cast
      <bad_cast&>(e);
}

void filetest()
{
  ifstream f("bad:name");
  if (!f.is_open())
    throw bad_file();
}

int main()
{
  for (int i=0; i<3; i++) {
    try {
      switch (i) {
      case 0:
        casttest();
        break;
      case 1:
        memtest();
        break;
      case 2:
        filetest();
        break;
      }
    }
    catch (exception &e) {
      cout << e.what()
           << endl;
    }
  }
  return 0;
}
```

**Listing 7**
```
void func1()
{
  exception e;

  throw &e;
}
void func2()
{
  exception *e=new exception;
  throw e;
}
void func3()
{
  exception e;

  throw e;
}
```

**All these listings can be found on this month's cover CD.**

*Continuing on from streams, we take a look at writing text files.*

# Readin' and writin'

Over the last few months, we've looked at Java streams. This time, we'll investigate readers and writers. With the background knowledge you now have on streams, you'll find readers and writers easy to use and understand.

Readers and writers are Java classes intended for text operations. They are to text what streams are to bytes. The principal feature of readers and writers is that they are capable of parsing any character encoding supported by the Java language, including ASCII, ISO 8859-1 (Latin-1), and Unicode.

## Readers and writers

The names of the reader class methods are similar to those of the stream classes for input, while the methods of the writer classes are similar to those of the stream classes for output. The only significant difference is that stream classes are byte based, while readers and writers are character based. The base classes are the abstract classes java.io.Reader and java.io.Writer.

Reader is the abstract base class for reading character streams, and Writer is the abstract base class for writing them. The methods of these classes are listed in the tables below. It's important to remember that these reader and writer classes are abstract base classes. You can use them if you wish, but Java also provides more advanced classes that can deal with specific circumstances.

```
dave at qed in /export/home/dave/Documents
> javac fw.java
> java fw
Data has been written to data.txt
Use notepad to open and inspect this file.
>
```

▲ Compiling and running the fw.java program

## Writing text to a file

To write text to a file on disk, Java provides a FileWriter class that extends the functions of the base Writer class. This is similar to how the Applet class is extended when writing your own applets.

To use the FileWriter class, you must create an instance of it like the one that follows.

```
FileWriter fw = new FileWriter("data.txt");
```

In this example, a new variable is defined, fw, which can be used to write to the file data.txt. This file will be created if it does not already exist. If it does exist, any contents will be overwritten. You can preserve the contents of an existing file and append new data to the end of it by adding an optional flag, as illustrated in the following example.

```
FileWriter fw = new FileWriter("data.txt",
true);
```

The second parameter specifies that you wish to append data to the end of the file. As the FileWriter class extends the abstract base class Writer, all of the methods listed in the second table below can be used for the FileWriter class too.

## Formatting text

You can now create new text files and write strings and character data to them. You can also flush and close the files. However, the methods of the Writer class aren't terribly sophisticated. For example, you can't write numeric data to the file. Fortunately, Java provides another advanced class called PrintWriter. This also extends the Writer base class to add new functions. In this case, PrintWriter works similarly to PrintStream, which was discussed a couple of months ago (see *APC* November, page 166). However, being a writer, it deals with character-level output rather than byte-level output.

A PrintWriter object is defined in terms of another writer, for example FileWriter. A new PrintWriter can be made as shown below.

```
PrintWriter pw = new PrintWriter (fw);
```

It can also be made as follows.

```
PrintWriter pw = new PrintWriter (new
FileWriter ("data.txt"));
```

Some important PrintWriter methods are listed below. All these deal with different data types.

- void print(boolean b)
- void print(char c)
- void print(char[] s)
- void print(double d)
- void print(float f)
- void print(int i)
- void print(long l)
- void print(String s)

The PrintWriter class also has println methods for the data types above. The print method outputs a character representation of the value passed in. The

**Methods in java.io.Reader Class**

| Name | Returns | Description |
|---|---|---|
| close() | void | Close the stream |
| mark(int readAheadLimit) | void | Mark the present position in the stream |
| markSupported() | boolean | Indicate if the stream supports the mark() operation |
| read() | int | Read a single character |
| read(char[] b) | int | Read characters into an array |
| int read(char[] b, int o, int l) | abstract | Read l characters into array b, starting at offset o |
| ready() | boolean | Indicate if the stream is ready for reading |
| reset() | void | Reset the stream |
| skip(long n) | long | Skip over n characters |

**Methods in java.io.Writer Class**

| Name | Returns | Description |
|---|---|---|
| close() | void | Close the stream |
| flush() | void | Write out any buffered characters |
| write(char[] b) | void | Write an array of characters |
| write(char[] b, int o, int l) | void | Write l characters from array b starting at offset o |
| write(int c) | void | Write a single character |
| write(String str) | void | Write a string |
| write(String s, int o, int l) | void | Write l characters in string s starting at offset o |

## Java source code

**fw.java**

```
import java.io.*;

public class fw
{
  public static void main(String[] args)
  throws java.io.IOException
  {
```

**Some data to write to a disk file**

```
    int anInt = 12;
    double aDouble = 44.332211;
    String str1 = "This text was written by the fw.java program";
```

**Create an output stream**

```
    FileWriter fw = new FileWriter ("data.txt");
    PrintWriter pw = new PrintWriter (fw);
```

**Write data to the disk file**

```
    pw.println (anInt);
    pw.println (aDouble);
    pw.println (str1);
```

**Some more complex examples**

```
    pw.println ();
    pw.print ("The integer is ");
    pw.print (anInt);
    pw.println ('.');

    for (int i = 0; i < 78; i++)
      pw.print ('-');
    pw.println ();
```

**Close the file**

```
    fw.close ();

    System.out.println ("Data has been written to data.txt");
    System.out.println ("Use notepad to open and inspect this file.");
  }
}
```

**This listing can be found on this month's cover CD.**

println method does this too, but adds a line break after the value.

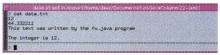
Any number of different print methods can be called in a row to format a line of output before finally using println to take the cursor to the next line. A call to print will begin outputting data where the previous call finished. You can use println with a parameter to output data and then end the line, or call println with no parameters to insert a line break. Calling println without parameters twice in succession has the effect of adding a blank line.

The PrintWriter has a rich set of methods, which makes it very useful when writing data to files or any other output source. This month's sample program creates a FileWriter object so that you can write data to a text file on disk. You then create a PrintWriter object so you can write different data types to the file.

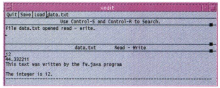
Call the methods of the PrintWriter object to output your data, then call the close method of the FileWriter object when you've finished. Once the program has run, use Notepad or any other text editor to view the data.txt file that has been created.

That's all there is to writing files. Next month, you'll learn how to read data from a disk file back into your Java program.

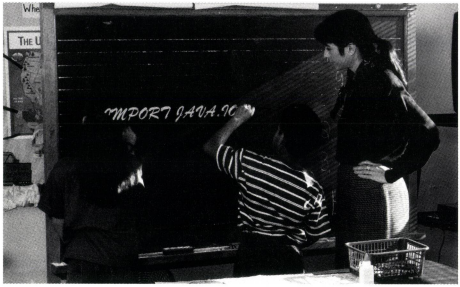
***David Williams***




▲ Listing the output of data.txt to the screen




▲ Viewing the data.txt file in a text editor




**For a complete archive of *APC* Java columns, see apcmag.com.**

**David Williams can be contacted at dave@qed.newcastle.edu.au.**

*Add a chatroom and instant messaging to your site with Active Server Pages.*

# Chatter box

This month, Insite takes a look at building a chatroom with Active Server Pages (ASP). A busy chatroom usually needs a database to manage users and messages, but the techniques covered this month show how application variables can be used for smaller chatrooms.



## Step 1: The global.asa file

A Web site running ASP creates a new session every time a visitor arrives at your site. The session applies only to that visitor and lasts as long as they spend browsing your site. If, after a set period, there is no activity from the user (the default inactivity time-out is usually 20 minutes), the session is terminated by the server.

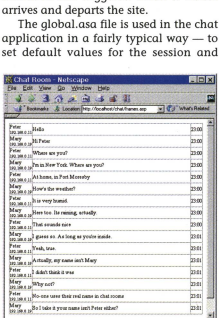
While a session is active, variables can be set on any ASP page and be used on any other ASP page. These are called session variables, and are said to have 'session scope'. The server tracks each session automatically with a cookie called ASPSESSIONID.

In addition to session scope, there is also 'application scope'. An application can be thought of as the period starting with the site's first visitor and ending when the server is stopped or restarted. Application variables, like session variables, can be set on any page and used at any time by any other page. The difference between the two scopes is that an application variable is always the same for every site visitor at any point in time, whereas a session variable only ever applies to one user. For example, a session variable may be used to store a visitor's name or email address, whereas an application variable may be used to store something like a page counter variable.

To help manage these two scopes, there is a special type of file called global.asa. This file is not a regular ASP file, but behaves more like a configuration file. It must be placed in the root directory of the server or else it will be ignored.

The global.asa file is used to define four event handlers. The Application_OnStart function is triggered when the first visitor arrives at the site after a restart or modification to the global.asa file. The Application_OnEnd is triggered when the server is shut down or stopped. The Session_OnStart and Session_OnEnd functions are triggered when a visitor arrives and departs the site.

The global.asa file is used in the chat application in a fairly typical way — to set default values for the session and application variables required for the chat pages.




▲ The chat page using regular FRAME tags

## Configuring the chat

Only one session variable is needed for the chatroom. This variable stores a user name for each participant, and is set by default to Guest as shown in listing 1 (note that underscore characters (_) are used in ASP to allow a single line of code to wrap onto the next line). Whenever an application variable is altered outside the Application_OnStart event, it is good practice to first lock the application. When you've finished, unlock it again as shown in listing 1. This is particularly important when you are updating more than one variable at a time, as you do whenever a chat message is sent or a new session is begun.

When you use application variables instead of a database to store the chat data, you need to set them up in the Application_OnStart handler. The first of these variables is used to store the number of active sessions, and is called application("userCount"). This number is increased by one every time a new session is started, and is decreased by one every time a session times out.

Four other application variables store the user name, message text, IP address and send time associated with each message. To do this effectively, arrays are used. Arrays are like dynamically resizable egg cartons, where each pocket has its own identifying number and can hold a single piece of information. To keep our example chatroom from being too demanding on the server, these arrays will be limited to storing the last 20 messages. So, at any point in time, the values at position 20 of the arrays' usernames, messages, IPaddresses and timestamps will contain information pertaining to the last message typed into the chat. (Remember, the first element in an array is indexed by 0, so the 20th element will be indexed by 19.)

## Step 2: The main page

The main page, called default.asp, is a template to hold the two pages that do all the real work in the chat: display.asp

and send.asp. There are two ways to build this main page, depending on how browser friendly you want your chat to be. The example in listing 2 uses Internet Explorer proprietary <IFRAME> tags to embed these two pages in a table, and listing 3 shows how regular <FRAME> tags can be used to achieve a similar result that works on most browsers.

With some clever DHTML scripting, you can make a Netscape Navigator-only version using layers that emulate the IFRAME version. You can then make the default a simple frames version, with some JavaScript browser detection that redirects Internet Explorer users to the IFRAME version and Netscape Navigator users to the LAYER version. Remember that all browsers will be in the same chatroom, regardless of which main page they use.

## Step 3: The send page

The send page has two functions. The first is to display a form that allows visitors to post messages to the chatroom. The second is to process the message form and update the application variables before redisplaying the form.

The form contains four input elements: two text fields and two buttons. The text fields are for the visitor's name and the message they wish to post. The visitor's name is automatically inserted by the server using the variable session("username"), which defaults to Guest when a new session is started. The first button is used to submit the form, and the second is used to refresh the display page in case it has stopped refreshing automatically. This is done using a simple piece of JavaScript that sets the location property of the frame named display (see this month's cover CD for the complete code).

Messages are submitted to the send.asp page. Upon loading, this page checks whether the form variable called "message" is empty, and if it isn't, performs the tasks required to update the application arrays.

To reduce the number of transformations being performed on large application variables such as arrays, it is good practice to use temporary arrays as intermediaries. This boosts server performance and ensures that the application is locked for shorter periods of time, making the site more responsive. This is demonstrated in listing 4, where four temporary arrays are assigned values from the application arrays. These are then 'rolled up' so that message 20 becomes message 19, message 19 becomes message 18, and so on. Once this loop is finished, message 20 is stored in the temporary arrays before the application arrays are updated.

The IP array is used to display visitors' IP addresses in the chat, mainly to distinguish between people using duplicate usernames. It is populated by using the CGI parameter REMOTE_ADDR that is available through ASP's built-in ServerVariables collection. The time array is populated with the current time using a combination of three ASP date functions. The first, Now() generates a string with the current date and time. When parsed by the Hour() and Minute() functions, the numerical values of the current hour and minute, as determined by the Now() function, are returned.




▲ The chat page using IFRAME tags

After updating the application variables (if required), a short piece of code sets the session("username") variable to whatever the visitor has typed into the username field on the message form. This ensures that a visitor's name is remembered from page to page. To make the chat a little easier to use, another small JavaScript is called in the OnLoad event of the <BODY> tag. This puts the focus on the message field, allowing the participant to type directly into the chat without having to manually select the message field in the form each time it loads.

## Step 4: The display page

The last page required by our chatroom is a simple HTML table that is dynamically generated, row by row, from our application arrays. This is very similar to the loop in send.asp, except it is used to display the arrays' contents rather than set them. The code that does this is shown in listing 5.

The only thing left to do on the display page is to make sure it is updated every few seconds so that new messages are displayed. This is done using a <META> tag with a REFRESH parameter set as shown below.

```
meta http-equiv="Refresh"
content="5;URL=display.asp#bottom"
```

The URL parameter has an anchor appended to the filename (#bottom). By using an <A name="bottom"> tag at the bottom of the display page, you ensure that when the page loads, it automatically scrolls all the way down. This means that the last chat message is always in view, even if all the messages do not fit onscreen at once. The META tag can be complemented with JavaScript to ensure regular refreshing of the contents in all browsers (see the code included on the cover CD for a complete example).

## Further Suggestions

The most obvious modification you can make to this chat application is to store the chat messages in a database rather than in application variables. This becomes necessary once you consistently have more than about 10 participants in the chatroom.

You can easily add multiple chatrooms as well. This can also be done using application variables, but this isn't recommended due to the memory usage on the server. All you need is another array with a chatroom identifier for each message. A more sensible alternative would be to use a database, creating an additional field to map the messages to a particular chatroom.

Other useful additions include a routine to test for duplicate usernames, and another to search messages for URLs, which can be converted to hyperlinks. You can also allow visitors to message each other privately. Finally, you could display chatroom info in any or every Web page on your site. This might draw people into the chat as they watch it progress while moving from page to page on your site.

*Daniel Potts*

Daniel Potts can be contacted at daniel@indigointeractive.com.au.

For a complete archive of *APC* Insite columns, see apcmag.com.

# Insite source code

**Listing 1: The GLOBAL.ASA file**

```
<script language="VBScript" runat="Server">

Sub Application_OnStart
 Application("userCount") = "0"
 redim Temp(19)
 Application("userNames") = Temp
 Application("messages") = Temp
 Application("IPaddresses") = Temp
 Application("timeStamps") = Temp
End Sub

Sub Session_OnStart
 session("userName") = "Guest"
 application.lock
  application("userCount") = _
     application("userCount") + 1
 application.unlock
End Sub

Sub Session_OnEnd
 application.lock
  application("userCount") = _
     application("userCount") - 1
 application.unlock
End Sub

</script>
```

**LISTING 2: Using IFRAME tags**

```
<table>
<tr>
 <td>
  <b>ASP Web Chat</b>
 </td>
</tr>
<tr>
 <td>
  <iframe src="display.asp#bottom"
   name="display">
  </iframe>
 </td>
</tr>
<tr>
 <td>
  <iframe src="send.asp"
   name="send">
  </iframe>
 </td>
</tr>
</table>
```

**Listing 3: Using regular FRAME tags**

```
<frameset rows="*,50">
  <frame name="display" src="display.asp#bottom">
  <frame name="send" src="send.asp">
</frameset>
```

**Listing 4: Processing the form**

```
<%
if trim(request.item("message")) <> "" then
 Application.lock
  userArray = Application("Usernames")
  messageArray = Application("messages")
  IParray = Application("ipaddresses")
  timeArray = Application("timeStamps")

  for x = 0 to 18
   userArray(x) = userArray(x+1)
   messageArray(x) = messageArray(x+1)
   IParray(x) = IParray(x+1)
   timeArray(x) = timeArray(x+1)
  next

  userArray(19) = request.item("userName")
  messageArray(19) = request.item("message")
  IParray(19) = Request.ServerVariables("REMOTE_ADDR")
  timeArray(19) = hour(now()) & ":" & minute(now())


  Application("Usernames") = userArray
  Application("messages") = messageArray
  Application("ipaddresses") = IParray
  Application("timeStamps") = timeArray
 Application.unlock
end if
%>
```

**Listing 5: Outputting the chat messages**

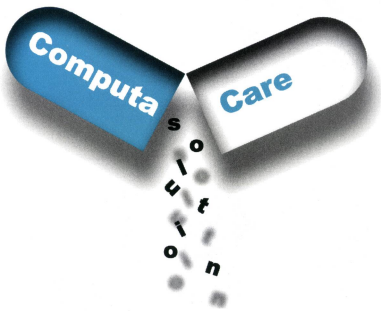
```
<table>
<%
  userArray = Application("userNames")
  messageArray = Application("messages")
  IParray = Application("IPaddresses")
  timeArray = Application("timeStamps")

for x = 0 to 19 %>
<tr>
  <td><font size="-1">
     <%= userArray(x) %>
     <font size="1"><br>
     <%= IParray(x) %></font>
  </td>
  <td width="100%">
     <font size="-1"><%= messageArray(x) %>
  </td>
  <td>
   <font size="-1"><%= timeArray(x) %>
  </td>
</tr>
<% next %>
</table>
```

**For the complete code for all the pages used here, check this month's cover CD.**

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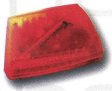



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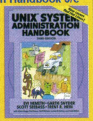

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| Ricoh 24x6x4 CDRW & DVD Kit | - $599 |
| Ricoh 32x12x6 | - $475 |
| **Monitors** | |
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| Mitsubishi 17" 1770F | - $395 |
| Sony 17" CPD-E200 | - $676 |
| LG 17" 795FT | - $825 |
| LG 17" 775N | - $385 |
| NEC 19" V920 | - $765 |
| Philips 19" 1095 | - $825 |
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| **Printers** | |
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| Xerox P8EX Laser Printer | - $515 |
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| **Video Cards** | |
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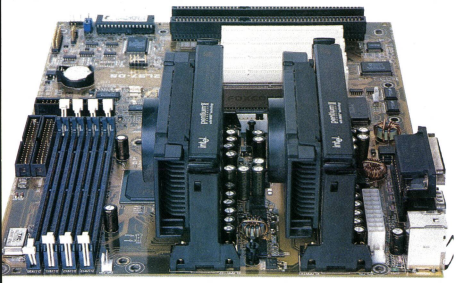
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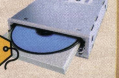


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| CC-2BK | BJI-201BK | BJC-600/610/620 Black | $6.00 |
| CC-3BK | BJI-643BK | BJC-800/820 Black | $12.00 |
| CC-4BK | BCI-21 | BJC-2000/4000/5000 Series Black | $7.00 |
| CC-5CL | BCI-21C | BJC-2000/4000/5000 Series 3-Colour | $12.00 |
| CC-6BKHC | BJI-201BK HC | BJC-600/610/620 Hi-Cap Black (14ML) | $9.00 |
| CC-7BK | BCI-10 | BJ-30 Black | $9.00 |
| CC-8BK | BCI-11 | BJC-70 Black | $9.00 |
| CC-9CL | BCI-11C | BJC-70 3-Colour | $17.00 |
| CC-11CL | BCI-61 | BJC-7000 Series 3-Colour | $32.00 |
| CC-12PCL | BCI-62 PHOTO | BJC-7000 Series Photo 6-Colour | $38.00 |
| CC-13B | BCI-3 | BJC-6000 Black | $25.00 |
| CC-14C | BCI-3C | BJC-6000 Cyan | $16.00 |
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| CE-53CL | SO20026 | STYLUS Colour/Colour Pro 3-Colour | $39.00 |
| CE-54BK | SO20047 | STYLUS 200/820/Colour II /IIs Black | $17.00 |
| CE-55CL | SO20049 | STYLUS 200/820/Colour II /IIs 3-Colour | $27.00 |
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| CE-57CL | SO20097 | STYLUS Colour 200/500 3-Colour | $30.00 |
| CE-58BK | SO20108 | STYLUS Colour 850/Photo 1520 Black | $22.00 |
| CE-59CL | SO20089 | STYLUS Colour 400/600/800/1520 3-Colour | $30.00 |
| CE-60PCD | SO20110 | STYLUS Colour 700/Photo/Photo 700 5-Colour | $34.00 |
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| A3WF | A3 White Film 100mu | 50 | $ 90.00 | 1.80 |
| A4CF | A4 Clear Film 100mu | 50 | $ 39.00 | 0.78 |
| A3CF | A3 Clear Film 100mu | 50 | $ 71.00 | 1.42 |
| A4FGP | A4 Full Gloss Photo Paper | 50 | $ 44.00 | 0.88 |
| A3FGP | A3 Full Gloss Photo Paper | 50 | $ 79.00 | 1.58 |
| A4PH | A4 Economy Photo Paper | 50 | $ 23.00 | 0.46 |
| AC2 | Artists Canvas | 25 | $ 60.00 | 2.40 |
| GC4F | Greeting Card (4 Fold) | 100 | $ 28.00 | 0.28 |
| GCBF | Greeting Card (Bi-Fold) | 100 | $ 48.00 | 0.48 |
| DCCS | Double Coated Card Stock | 50 | $ 24.00 | 0.48 |
| GCS | Glossy Card Stock | 50 | $ 24.00 | 0.48 |
| TTP | T-Shirt Transfer Paper | 15 | $ 15.00 | 1.00 |
| MP | Magnetic Paper | 25 | $ 58.00 | 2.32 |
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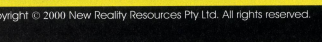








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| CANON BJC-70/BJC 80 | 60 | 21-BKL |
| CANON BC-01/02/BJ-10E/20/200/BJC-210/240/255/265/1000 | 6 | 3-BKL |
| CANON BJ-300/330 | 7 | 4-BKL |
| CANON BJC-600/610/620 | 16 | 5-BKL |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21 | 45 | 19-BKL |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20 | 9 | 18-BKL |
| CANON BJC-3000/6000/6500/8000 | 6 | 46-BKL |
| CANON BJC-7000 Series | 6 | 43-BKL |
| HP Desk Jet 400/500 Series | 6 | 8A-BKL |
| HP Desk Jet 600/660/690 Series | 6 | 8B-BKL |
| HP Desk Jet 700/800/900/1000/ Series | 6 | 29-BKL |
| HP Deskjet 300 Series & Olivetti JP's! | 8 | 7-BKL |
| EPSON Stylus 400/800/800+/1000 | 8 | 1-BKL |
| EPSON Stylus Colour /PRO/XL | 8 | 2-BKL |
| EPSON Stylus 820/colour II/IIs | 12 | 23-BKL |
| EPSON Stylus Colour 200/300/400/500/600/800/850/1520 | 12 | 33A-BKL |
| EPSON Stylus Colour 440/460/480/640/660/700/740/760/900 | 12 | 33B-BKL |
| IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series | 6 | 35A-BKL |
| IBM/LEXMARK 5000/5700/7000 & Z Series | 6 | 35B-BKL |
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| CANON BJC-210/210SP/240/255/265/1000 | 3x12 | 25-CLR |
| CANON BJC-600/610/620 | 3x8 | 10-CLR |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21 | 3x30 | 17-CLR |
| CANON BJC-3000/6000/8000 Series | 3x6 | 47-CLR |
| CANON BJC-7000 Series | 3x6 | 44-CLR |
| HP Colour Desk Jet 300/400/500 Series & Olivetti! | 3x12 | 14A-CLR |
| HP Colour Desk Jet 600C/660C/690C Series | 3x12 | 14B-CLR |
| HP Desk Jet 850C/855C/870C/1000C Series | 3x3 | 30A-CLR |
| HP Desk Jet 710/720/890/900 Series | 3x3 | 30B-CLR |
| EPSON Stylus Colour /PRO/XL | 3x4 | 16-CLR |
| EPSON Stylus 820/colour II/IIs | 3x12 | 24-CLR |
| EPSON Stylus Colour 200/300/400/500/600/800/850/1520 | 3x12 | 34A-CLR |
| EPSON Stylus Colour 440/460/480/640/660/700/740/760/900 | 3x12 | 34B-CLR |
| IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series | 3x6 | 36A-CLR |
| IBM/LEXMARK 5000/5700/7000 & Z Series | 3x6 | 36B-CLR |
| BROTHER 7160/9100C | 3x6 | 50-CLR |
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## PROCESSORS

| | |
|---|---|
| Intel Celeron 667A (oem) (S370) | $227 |
| Intel Celeron 700A (oem) (S370) | $232 |
| Intel Celeron 733A (oem) (S370) | $304 |
| Intel Celeron 766A (oem) (S370) | $449 |
| Intel Pentium III-750/100 (S370) | $463 |
| Intel Pentium III-800/133 (S370) | $474 |
| Intel Pentium III-850/100 (S370) | $541 |
| Intel Pentium III-866/133 (S370) | $556 |
| Intel Pentium III-933/133 (S370) | $796 |
| Intel Pentium III-1000/133 (S370) | $1,146 |
| AMD K6-2 500 3D (oem) (s-7) | $140 |
| AMD K6-3 450+ 3D (oem) (s-7) | $145 |
| AMD Duron 700 (oem) (Socket A) | $182 |
| AMD Duron 800 (oem) (Socket A) | $272 |
| AMD Athlon K7- 800T 3D (oem) (Socket A) | $362 |
| AMD Athlon K7- 900T 3D (oem) (Socket A) | $449 |
| AMD Athlon K7- 1000T 3D (oem) (Socket A) | $655 |
| AMD Athlon K7- 1100T 3D (oem) (Socket A) | $873 |
| AMD Athlon K7- 1200T 3D (oem) (Socket A) | $1,155 |

## MOTHERBOARDS

| | |
|---|---|
| Abit SE6 (815, S370, VGA, Audio, U-100, 133) | $290 |
| Abit BX133-RAID (BX, S370, U-100, RAID) | $246 |
| Abit KT7 (VIA, Soc-A, U-66) | $280 |
| AOpen AX3S (815, S370, VGA, Audio, U-100) | $294 |
| Asus CUSL2 (815,U-100,VGA,AGP Pro4x) | $347 |
| Asus CUSL2-C (815, U-100,AGP 4x) | $290 |
| Asus CUV-4X (VIA, S370, AGP Pro 4x, 133) | $250 |
| Asus K7V-T (VIA KX133, Slot-A, U-66) | $308 |
| FIC AZ11 (VIA, Soc-A, Audio, ATX, U-66) | $263 |
| Gigabyte 5AA (ALI, Soc-7, AT, U-66) | $153 |

| | |
|---|---|
| Gigabyte 5AX (ALI, Soc-7, ATX, U-66) | $157 |
| Gigabyte GA-6OXM7E (815, Audio, U-100) | $310 |
| Gigabyte 6VXC7-4X (VIA, S370, AGP 4x) | $183 |
| Gigabyte GA-7ZX (VIA, Soc-A, Audio, U-66) | $251 |
| Gigabyte GA-7ZM (VIA, Soc-A, M-ATX, Audio) | $222 |
| Gigabyte GA-6VX7-1394 (VIA, 3xIEEE-1394) | $275 |
| MSI 694D Pro (VIA, Dual, S370, Audio, U-100) | $323 |
| SuperO i815 (815, M-ATX, AGP 4x, AMR/2P) | $305 |
| SuperO i815 (815, ATX, AGP 4x, AMR/2P) | $367 |
| Supermicro 370DLE Board ServerWorks | $697 |

## MEMORY

| | |
|---|---|
| 64MB PC133 SDRAM 168pin (oem) | $72 |
| 128MB PC133 SDRAM 168pin (oem) | $143 |
| 256MB PC133 SDRAM 168pin (oem) | $399 |
| 128MB SDRAM PC150 168pin (oem) | $260 |
| 128MB PC133 SDRAM ECC 168pin | $258 |
| 256MB PC133 SDRAM ECC 168pin | $506 |
| 128MB Rambus RDRAM RIMM 800M ECC | $1,049 |
| 256MB Rambus RDRAM RIMM 800M ECC | $2,059 |

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## HARD DISKS - IDE

| | |
|---|---|
| 20Gb Seagate Medallist U-66 | $267 |
| 30Gb Seagate Barracuda 2M 7200 | $366 |
| 45Gb 75GXP IBM Deskstar U-100 2M 7200 | $493 |
| 60Gb 75GXP IBM Deskstar U-100 2M 7200 | $818 |
| 75Gb 75GXP IBM Deskstar U-100 2M 7200 | $1,084 |
| 20.4Gb Quantum FB LCT15 U-66 | $269 |
| 30.0Gb Quantum FB LCT15 U-66 | $296 |
| 20Gb Quantum FB LM U-66 2M 7200 | $277 |
| 30Gb Quantum FB LM U-66 2M 7200 | $357 |
| 30 Gb WD Caviar U-66 5400 | $331 |
| 10.2Gb Fujitsu U-66 5400 | $211 |
| 20.4Gb Fujitsu U-66 2M 7200 | $277 |

## HARD DISKS - NOTEBOOK

| | |
|---|---|
| 10GB Hitachi | $363 |
| 6Gb 12GN IBM Travelstar U-66 9.5mm | $304 |
| 20Gb 20GN IBM Travelstar U-66 12.5mm | $684 |
| 30Gb 30GT IBM Travelstar U-66 12.5mm | $1,076 |

## HARD DISKS - SCSI

| | |
|---|---|
| 9Gb Quantum Atlas V U-160 LVD68 | $431 |
| 18Gb Quantum Atlas V U-160 LVD68 | $676 |
| 36Gb Quantum Atlas V LVD68 | $1,303 |
| 9Gb Quantum Atlas 10K II U-160 LVD68 | $578 |
| 18Gb Quantum Atlas 10K II U-160 LVD68 | $877 |
| 36Gb Quantum Atlas 10K II U-160 LVD68 | $1,378 |
| 73Gb Quantum Atlas 10K II U-160 LVD68 | $2,919 |
| 9.2Gb Seagate Cheetah LVD68 10,000rpm | $548 |
| 18.4Gb Seagate Cheetah LVD68 10,000rpm | $815 |
| 36.7Gb Seagate Cheetah LVD68 10,000rpm | $1,326 |
| 73.4Gb Seagate Cheetah LVD68 10,000rpm | $2,458 |
| 18Gb Seagate Cheetah LVD68 15,000rpm | $1,068 |
| 9Gb IBM Ultrastar 36LZX U-160 10k LVD68 | $527 |
| 18Gb IBM Ultrastar 36LZX U-160 10k LVD68 | $774 |
| 36Gb IBM Ultrastar 36LZX U-160 10k LVD68 | $1,280 |

## FDD & STORAGE DEVICES

| | |
|---|---|
| 1.44MB, 3.5" Floppy Disk Drive | $28 |
| LS120 SuperDisk 2x Int. IDE (oem) | $160 |
| Iomega 100M Zip Int. IDE (oem) | $137 |
| Iomega 100M Zip Ext. USB | $214 |
| Iomega 250M Zip Int. IDE (oem) | $199 |
| Iomega 250M Zip Ext. USB | $406 |
| ORB 2.2GB Int. IDE Drive (oem) | $310 |
| ORB 2.2GB Ext. USB Drive (retail) | $425 |

## VIDEO & GAMES CARDS

| | |
|---|---|
| 4M PCI Video Card | $65 |
| 4M Eagle S3 Trio 32/2X AGP VGA Card | $50 |
| 8M Eagle S3 Trio 32/2X AGP VGA Card | $57 |
| 16M Eagle TNT2 Vanta | $103 |
| 32M Eagle TNT2 Vanta | $129 |
| 32M Sniper TNT2 M64 PCI | $198 |
| 32M Asus V7100 GeForce II MX TV | $332 |
| 32M Asus V7100 GeForce II MX 2VID | $410 |
| 32M Asus V7700 GeForce II GTS DDR | $530 |
| 32M Asus V7700 GeForce II GTS DDR Deluxe | $583 |
| 64M Asus V7700 GeForce II GTS DDR PRO | $844 |
| 64M ATI Radeon DDR Retail | $784 |
| 32M Creative Blaster GeForce II GTS | $563 |
| 32M Creative Blaster GeForce II MX | $287 |
| 32M Leadtek Winfast GeForce II MX TV | $287 |
| 32M Leadtek GeForce II MX Dual Head TV | $370 |
| 32M Leadtek Winfast GeForce II GTS TV (retail) | $563 |
| 64M Leadtek Winfast GeForce II GTS TV (retail) | $752 |
| 16M Millennium G400 300Mhz (oem) | $241 |
| 32M Millennium G400 300Mhz (oem) | $292 |
| 16M Millennium G400 Marvel TV/DVD (retail) | $756 |
| 16M G450 Dual Head DDR 360Mhz (oem) | $275 |
| 16M Voodoo 3 3000 166Mhz AGP | $208 |
| 16M Voodoo 3 3500 183Mhz TV I/O | $484 |
| 64M Voodoo 5 5500 AGP Retail Pack | $621 |
| 32M Elsa Gladiac GeForce II GTS AGP | $677 |
| 64M Elsa Gloria II nVidia Quatro AGP | $1,720 |
| 32MB Guillemot 3D Prophet II MX | $275 |
| 32MB Guillemot 3D Prophet II MX 2xDisplay | $311 |
| 32MB Guillemot 3D Prophet II GTS | $628 |
| 64MB Guillemot 3D Prophet II GTS PRO (TV) | $744 |
| 64MB Guillemot 3D Prophet II Ultra (TV) | $1,016 |
| 32M 3Dlabs Oxygen VX1 Glint R3 AGP | $446 |
| 32M 3Dlabs Oxygen GVX1 Glint R3 AGP | $1,184 |

## MONITORS

| | |
|---|---|
| Mitsubishi D/view 155fi 15", .28 1024x768 | $257 |
| Mitsubishi D/view 1770f 17", .27 | $385 |
| Mitsubishi D/view 17NF 17", .25 (Flatron) | $658 |
| Mitsubishi D/view 19NF 19", .25 (Flatron) | $1,090 |
| Mitsubishi D/view 2107 21", .26 1600x1280 | $1,705 |
| Acer 54E 15", .28 1024x768 66Hz | $257 |
| Acer 77C 17", .27 1280x1024 60Hz | $382 |
| Auriga ColorPro 19D, 19" .25 (Flatron) | $887 |
| Hitachi CM625 17" (Flat Trinitron) | $658 |
| Hitachi CM771 19", .22 1800x1350 (Flat) | $1,035 |
| Hitachi CM811 21", .22 1600x1280 | $1,660 |
| Hitachi CM813 21", .22 1600x1280 | $1,832 |
| LG 795FT Flatron 0.25 17" | $698 |
| NEC V520 15" Monitor 1280x1024, 0.28 | $287 |
| NEC V720 17" Monitor 1280x1024, 0.28 | $456 |
| NEC V920 19" Monitor 1600x1200 | $776 |
| Panasonic E70I 17" Digital Color 0.27 | $453 |
| Panasonic PL70I 17" Digital Color 0.25 | $678 |
| Panasonic PF90 19" Digital Color 0.22 | $1,081 |
| Sony E200 17", .24-.25 (Flat Trinitron) | $690 |
| Sony G400 19", .24-.25 (Flat Trinitron) | $1,246 |
| Sony G500 21", .24 (Flat Trinitron) | $2,045 |
| Viewmaster M1515 15", .28 1024x768 | $242 |
| Viewsonic E70 17", .27 1280x1024 | $385 |
| Viewsonic E790 19", .26 1600x1280 | $766 |
| Viewsonic PF790 19", .25 1600x1200 | $1,050 |

## LCD MONITORS

| | |
|---|---|
| Acer FP558 15" LCD (Speaker + USB) | $1,823 |
| Acer FP751 17" LCD (Speaker + USB) | $3,511 |
| Hitachi CML151XW 15" TFT Monitor | $1,910 |
| Hitachi CML170SXW 17" TFT Monitor | $2,994 |
| LG 15" SW570LS LCD Monitor | $1,639 |
| Keycorp 15.1" TFT Monitor | $1,786 |
| Mitsubishi TFT 15" DV150 1024x768 | $1,916 |
| NEC 15" LCD 1525V Monitor 1024 x 768 | $1,922 |
| Panasonic 15" LC50S USB+Speakers | $2,008 |
| Sony CPDM151 15.1",TFT Monitor | $2,211 |
| Viewsonic 15" LCD VE150 1024x768 | $1,724 |

## CASINGS

| | |
|---|---|
| Deluxe Midi Tower ATX | $65 |
| AOpen Midi Tower ATX KF45B | $100 |
| AOpen Full Tower ATX HQ08 | $193 |
| Macase Midi Tower ATX KA-80 250W | $128 |
| Macase Midi Tower ATX KA-580WP 250W | $131 |
| Macase Full Tower ATX KA-C-80 300W | $254 |
| Macase KI-P20 2U Rackmount ATX 300W | $584 |
| Macase 8-Bay Ext. SCSI -50 CDROM tower | $572 |
| 801 SuperO Deluxe Dual PIII/Xeon Chassis | $909 |
| 250W ATX Power Supply | $50 |
| 300W ATX Power Supply | $80 |

## KEYBOARDS & MICE

| | |
|---|---|
| Acer Accufeel Keyboard PS/2 | $24 |
| Honeywell Spacemate II Din-5&PS/2 | $44 |
| Fujitsu Internet Keyboard PS/2 | $37 |
| KeyTronic Designer Keyboard PS/2 (Black) | $45 |
| Logitech Internet Keyboard PS/2 (oem) | $50 |
| Logitech Cordless Freedom Navigator (K+M) | $212 |
| Logitech Cordless Freedom Pro (K+M) | $220 |
| Microsoft Internet Keyboard PS/2 (oem) | $48 |
| Microsoft Internet Keyboard Pro (oem) | $76 |
| Microsoft Ergonomic Elite PS/2 | $63 |
| Microsoft Natural Keyboard Pro PS/2&USB | $115 |
| Logitech Wheel Mouse PS/2 (oem) | $37 |
| Logitech Wheel Mouse Optical USB&PS/2 | $77 |
| Logitech iFeel Mouse Optical USB | $96 |
| Microsoft Intellimouse PS/2 (oem) | $44 |
| Microsoft Intellimouse Optical USB&PS/2 | $84 |
| Microsoft Intellimouse Explorer USB&PS/2 | $96 |

## CD ROM & DVD ROM

| | |
|---|---|
| 40x IDE ATAPI CD-ROM Drive | $72 |
| 52x Creative IDE CD-ROM Drive | $80 |
| 32x Teac SCSI CD-ROM Drive | $146 |
| Pioneer 6x DVD 32xR IDE Bare Drive (06/99) | $191 |
| Pioneer 16x DVD 40xR IDE Bare Drive | $244 |
| Pioneer 10x DVD 40xR SCSI Bare Drive | $328 |

## CD REWRITERS

| | |
|---|---|
| Plextor (12x10x32) IDE + Soft + Media | $746 |
| HP 9100i (8x4x32) IDE + Soft (OEM) | $371 |
| Mitsubishi (8x4x30) IDE + Soft + Media | $310 |
| Acer (4x4x6) Ext USB | $464 |
| Ricoh 7120A (12x10x32) IDE + Soft + Media | $433 |
| Ricoh 9060A (6x4x24x4) IDE DVD-CDRW | $500 |
| Sony 140E (8x4x30) IDE Bare Drive (OEM) | $316 |
| Sony 145E (10x4x32) IDE Bare Drive (OEM) | $379 |
| Iomega Zip (8x4x32) Int IDE | $306 |
| Iomega Zip (4x4x6) Ext USB | $489 |
| Yamaha (8x8x24) IDE + Soft + Media | $404 |
| Yamaha (8x8x24) Ext Firewire + Soft + Media | $740 |

## SOUND CARDS

| | |
|---|---|
| Sound Blaster PCI-128 1-Channel (oem) | $30 |
| Sound Blaster PCI-128 2-Channel (oem) | $50 |
| Sound Blaster LIVE (oem) | $113 |
| Sound Blaster LIVE DG | $197 |
| Sound Blaster LIVE Platinum 5.1 | $479 |
| Diamond Monster Sound MX400 (oem) | $110 |
| Guillemot Maxi Sound Muse | $75 |
| Guillemot Maxi Sound Fortissimo XL | $108 |
| Guillemot Maxi Studio ISIS 8-In 4-Out (oem) | $600 |

## SPEAKERS

| | |
|---|---|
| Altec Lansing ACS22 - 2p | $60 |
| Altec Lansing ACS33 - 3p | $90 |
| Altec Lansing ACS45.1 Power Cube - 3p | $165 |
| Altec Lansing ATP3 Flatpanel -3p (multi-channel) | $220 |
| Altec Lansing ACS56 Gamers -5p Digital in | $290 |
| Altec Lansing ACS48 Power Cube + - 3p | $284 |
| Cambridge PCWorks 3-p | $90 |
| Cambridge PCWorks FPS1000 4-p Surround | $168 |
| Cambridge FPS2000 4-p Surround Digital | $381 |
| Cambridge DTT2500D 6-p Desktop Theater | $667 |
| Cambridge DTT3500D 6-p Desktop Theater | $818 |
| Logitech SoundMan S-20 | $99 |
| Logitech SoundMan SR-30 | $165 |
| Logitech SoundMan Xtrusio DSR-100 | $352 |
| Yamaha YST/MS30 Subwoofer + Speakers | $123 |
| Yamaha YST/MS55 Sub + Speakers USB | $255 |

## PRINTERS

| | |
|---|---|
| Brother HL-1240 12ppm 2M Laser | $518 |
| Brother HL-1250 12ppm 4M Laser | $658 |
| Brother MFC-970MC All-in-One Colour InkJet | $529 |
| Samsung ML-5000A 8ppm | $523 |
| Samsung ML-6050 12ppm | $774 |
| Canon BJC-1000SP | $120 |
| Canon BJC-2100SP 5ppm | $148 |
| Canon BJC-3000 (+USB) | $239 |
| Canon BJC-6200 8ppm (1440x720) | $350 |
| Canon BJC-6500 8ppm (1440x720) (A3) | $594 |
| Canon BJC-8200 | $595 |
| Canon LBP800W 8ppm | $499 |
| Canon MPC-20 Multifunction Photo BJ 4 in 1 | $477 |
| Epson Stylus Color 480 (720x720) | $160 |
| Epson Stylus Color 580 (1440x720) (USB) | $181 |
| Epson Stylus Color 680 (2440x1440) (+USB) | $303 |
| Epson Stylus Color 880 (2880x720) (+USB) | $500 |
| Epson Stylus Color 980 (2880x720) (+USB) | $702 |
| Epson Stylus Color 1160 (A3+) | $777 |
| Epson Stylus Photo 720 | $394 |
| Epson Stylus Photo 870 | $589 |
| Epson Stylus Photo 1270 (A3) | $838 |
| Epson Stylus Photo 2000P (A3) | $1,835 |
| Epson LX300+ 9P D/M 264cps 80c (S/P) | $251 |
| Epson EPL-5700L | $635 |
| HP DeskJet 640C | $178 |
| HP DeskJet 840C | $271 |
| HP DeskJet 930C | $383 |
| HP DeskJet 970Cxi | $696 |
| HP DeskJet 1225C (A3) | $589 |
| HP OfficeJet 725 4 in 1 | $628 |
| HP PhotoSmart P1000 Printer | $708 |
| HP LaserJet 1100 8ppm | $737 |
| HP LaserJet 2100 | $1,289 |
| HP LaserJet 4050 | $2,094 |
| HP LaserJet Colour 4500 | $5,027 |
| HP LaserJet 5000 A3 | $2,734 |
| HP LaserJet 8000 | $4,411 |
| HP LaserJet 8100 | $4,923 |
| Kyocera FS-1000 | $627 |
| Kyocera FS-1200 | $1,046 |
| Kyocera FS-1750 | $1,595 |
| Kyocera FS-3750 | $1,995 |
| Kyocera FS-5900C | $4,080 |
| Panasonic KX-P6100 | $308 |
| Xerox DocuPrint P8ex 8ppm | $415 |

## SCANNERS

| | |
|---|---|
| Acer 340P EPP (300x600) | $115 |
| Agfa Snapscan E20 USB (600x1200) | $213 |
| Agfa Snapscan E40 USB (1200x2400) | $345 |
| Agfa Snapscan E50 + 35mm (1200x2400) | $416 |
| Mitsubishi DV648U USB (600X1200) | $131 |
| Mitsubishi DV648UT USB+TPO (600X1200) | $255 |
| Canon CanoScan N340P (300x600) | $115 |
| Canon CanoScan N640P (600x1200) | $140 |
| Canon CanoScan N650U USB (600x1200) | $180 |
| Canon CanoScan D660U USB + 35mm Film | $274 |
| Canon CanoScan N1220U USB (1200x2400) | $284 |
| Canon CanoScan FB1210U USB (1200x2400) | $441 |
| Epson Perfection 640 USB (600x2400) | $280 |
| Epson Perfection 1240 USB (1200x2400) | $464 |
| Epson Perfection 1640SU SCSI & USB | $561 |
| Fujitsu 3091 DC | $1,241 |
| Fujitsu ScanPartner 600C | $2,608 |
| Fujitsu 3093 DG | $7,298 |
| HP ScanJet 3300C USB | $192 |
| HP ScanJet 3400C USB | $276 |
| HP ScanJet 5300C USB | $461 |
| HP ScanJet 5370C USB | $588 |
| Microtek 4600 (1200x2400) USB | $401 |
| Microtek X12 USL (1200x2400) USB&SCSI | $584 |
| Microtek Scanmaker 4 SCSI (Trans) | $1,279 |
| Microtek Scanmaker 9600XL A3 | $3,091 |

## MODEMS

| | |
|---|---|
| 56K V90 Fax Modem Int. PCI Web Excel | $53 |
| 56K V90 Fax Modem Ext. Diamond Voice | $100 |
| Banksia WaveSP 56K V90 Desktop Ext. (oem) | $170 |
| Netcomm InModem 56K V90 Int. PCI (oem) | $70 |
| Netcomm Roadster II 56K V90 Ext. (oem) | $198 |
| Netcomm Simplicity External modem | $175 |
| Netcomm Mega I-Modem External | $139 |
| 3Com USR FaxModem 56K Ext. | $210 |
| 3Com USR Message Modem 56K Ext. | $244 |
| Paradise Wavecom 56K Pro | $182 |
| Swann Speed Demon Internal Modem | $58 |
| Swann Speed Demon External Modem | $112 |
| Swann Turbo 56K External Modem | $150 |
| Swann Smart II External Modem | $189 |
| Dynalink ALE070 USB ADSL Modem | $374 |

## DIGITAL CAMERAS & MP3 PLAYERS

| | |
|---|---|
| UMAX Extracam Digital Camera | $261 |
| Agfa Ephoto CL30 1440x1080 4Mb | $726 |
| Agfa Ephoto CL50 1600x1200 8Mb | $1,452 |
| Canon PowerShot Digital IXUS | $1,097 |
| Canon PowerShot S10 | $1,330 |
| HP PhotoSmart S20 | $846 |
| HP PhotoSmart C200 | $635 |
| Epson Photo PC700 1280x960 + 1 4Mb | $1,003 |
| Kodak EZ-200 | $250 |
| Kodak DC-3200 | $493 |
| Kodak DC-4800 | $1,518 |
| Sony Mavica MVCFD85 Digital Camera | $1,507 |
| Sony Mavica MVCFD90 Digital Camera | $1,703 |
| Sony Mavica MVCCD1000 Digital Camera | $2,849 |
| Diamond Rio 500 64MB (Green/Gray/Purple) | $428 |
| Nomad II 64 Mb + Docking Station | $608 |
| Nomad II MG 64MB + Docking Station | $725 |
| Creative Labs MP3 Jukebox | $939 |

## TV TUNERS

| | |
|---|---|
| Dynalink TV Tuner PCI + FM radio | $120 |
| Hauppauge WinTV GO FM PCI | $191 |
| Hauppauge WinTV USB | $251 |
| Miro Media PCTV Rave | $156 |
| Miro Media PCTV | $215 |
| Averkey Pro PC-TV converter 800x600 | $303 |

## VIDEO CONFERENCE CAMERA

| | |
|---|---|
| Creative V/Blaster Web Cam II USB (retail) | $208 |
| Kodak DVC-325 Digital Video Camera USB | $157 |
| Logitech QuickCam Express USB (oem) | $84 |
| Logitech QuickCam Pro 3000 | $235 |

## VIDEO CAPTURE CARDS

| | |
|---|---|
| 32M Matrox RT2000 kit | $2,626 |
| Pinnacle Miro Studio DC10 + | $531 |
| Pinnacle Miro Video DC30 + | $1,327 |
| Pinnacle Miro Studio DV | $297 |
| Pinnacle Miro Video DV200 | $1,071 |
| Pinnacle Miro Video DV500 | $2,192 |
| Canopus EZDV | $564 |
| Canopus EZDV Plus w/ Ulead MSP6.0 | $752 |
| Canopus DVStorm w/int. Bay (No Prem) | $3,254 |
| VideoWorks Firewire Card | $160 |
| Firewire VideoWorks Professional | $298 |

## CONTROLLER CARD

| | |
|---|---|
| Promise U-100 + Cable (oem) | $98 |
| Promise Fastrak-100 IDE RAID Array 0/1 | $226 |
| Adaptec 2904 PCI | $115 |
| Adaptec 2930 U PCI (Kit) + Soft + Cable | $217 |
| Adaptec 19160 PCI U-160 1xchnl 32-Bit | $367 |
| Adaptec 29160N U-160 32-Bit PCI Card | $571 |
| Adaptec 2100S U-160 RAID 1-Channel (Kit) | $1,014 |

## TAPE BACK-UP

| | |
|---|---|
| Onstream 30GB Internal IDE Drive | $527 |
| Seagate 20GB TR5 IDE Kit + Backup Exec | $556 |
| Seagate Scorpion 24GB DAT DDS-3 | $1,471 |
| Sony DDS3 12-24GB 9000/R Int. Tape Drive | $1,413 |
| HP LynxDAT 12-24GB Bare Mech Int. | $1,586 |
| HP LynxDAT 20-40GB Bare Mech Int. | $2,013 |

## NETWORK ADAPTORS

| | |
|---|---|
| Skymaster 10M Combo ISA/PCI (NE2000) | $22 |
| Skymaster 10/100M PCI (OEM) | $36 |
| D-Link DFE-530TX 10/100M PCI Ethernet | $55 |
| 3Com 3C905 10/100M PCI Ethernet (OEM) | $112 |
| Intel 8460B 10/100M PCI Ethernet (oem) | $96 |
| NetGear FA310TX 10/100M PCI (oem) | $55 |

## HUBS

| | |
|---|---|
| Swann Mini 4-Port USB Hub | $54 |
| Accton 8-p 10M Hub (oem) | $64 |
| Accton 4-p 10/100M Switching Hub | $198 |
| Accton 8-p 10/100M Switching Hub | $239 |
| D-Link 8-Port 10/100 Switch (DES-1008D) | $320 |
| D-Link Print Server 1-Port 10M (DP-101) | $238 |
| Intel InBusiness 4-p 100M (SH100TX4AU) | $203 |
| Intel InBusiness 8-p 10/100M Hub Auto | $285 |
| Intel InBusiness 16-p 10/100M Hub Auto | $531 |
| Netgear 5-p 10/100 Switch + 2xFA310 + Cbl | $272 |
| Netgear 4-p 10/100 Dual Speed Hub Ext. | $197 |
| Netgear 8-p 10/100 Dual Speed Hub Ext. | $261 |
| Netgear 5-p 10/100 Fast Switch Ext. PS | $216 |
| Netgear 8-p 10/100 Fast Switch Ext. PS | $325 |
| Netgear 16-p 10/100 Fast Switch Ext. | $656 |
| OfficeConnect Fast Ethernet Hub 4-Port | $253 |
| OfficeConnect Fast Ethernet Hub 8-Port | $391 |

## POWER PROTECTION (UPS)

| | |
|---|---|
| SOLA 305/250VA UPS | $172 |
| APC Backup 300 Multipath | $151 |
| APC Backup 500 Multipath | $250 |
| APC Backup 650 Multipath | $291 |
| APC Smart-UPS 420 & Powerchute+ | $381 |
| APC Smart-UPS 620 & Powerchute+ | $509 |
| APC Smart-UPS 700 & Powerchute+ | $678 |

## FEATURE PRODUCTS

### MOTHERBOARDS

| | |
|---|---|
| *Gigabyte 6VXE7+ (VIA, S370, U-66)* | *$162* |
| *Asus P3V4X (VIA, Slot-1, U-66, AGP 4x, 133)* | *$218* |
| *Gigabyte GA-6VXDC7 (VIA, Dual S370)* | *$303* |
| *Asus ATV (VIA, Soc-A, U-100)* | *$355* |
| *Abit KT7-RAID (VIA, Soc-A, U-100, RAID)* | *$343* |

### HARD DISKS - IDE

| | |
|---|---|
| *10Gb Seagate Medallist U-66* | *$211* |
| *20.4Gb Fujitsu U-66 5400* | *$249* |
| *20Gb Seagate Barracuda 2M 7200* | *$273* |
| *30Gb 75GXP IBM Deskstar U-100 2M 7200* | *$352* |
| *45 Gb WD Caviar U-66 5400* | *$412* |

### VIDEO & GAMES CARDS

| | |
|---|---|
| *16M Diamond S3 S540 w/ TV Out (oem)* | *$129* |
| *32M Sniper TNT2 M64 AGP TV Out* | *$161* |
| *32M Leadtek Winfast Geforce II MX (oem)* | *$237* |
| *32M G450 Dual Head DDR 360Mhz (oem)* | *$370* |
| *64MB Guillemot 3D Prophet II GTS* | *$719* |

### MONITORS

| | |
|---|---|
| *Viewmaster M17SL 17", .27 MPRII OSD* | *$355* |
| *Hitachi CM615 17", .24 1280x1024* | *$395* |
| *Auriga ColorPro 17D, 17" .25 (Flatron)* | *$550* |
| *Hitachi CM715 19", .22 1600x1200* | *$878* |
| *Keycorp 12.1"TFT Monitor* | *$1,269* |

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- 250W ATX Midi Tower Case
- Microsoft Internet PS/2 Keyboard
- Microsoft Intellimouse PS/2
- LG 10x DVD 40x CD-Rom Drive
- Creative Sound Blaster Live! Soundcard
- Altec Lansing ACS33 Stereo Speakers
- 56K V90 Internal Fax/Data Modem
- Windows 98 / Millennium installed & conf.

| Price | |
|---|---|
| D-700 | $1,980 |
| D-800 | $2,060 |
| K7-900T | $2,290 |
| K7-1000T | $2,510 |
| K7-1100T | $2,720 |
| K7-1200T | $2,900 |

**Thunderbird K7-800T $2,190**

## forté Thorium II Server*

- Intel Pentium III 800 Processor (Dual capable)
- Gigabyte GA-6VXD7 Dual CPU M'board
- 256Mb SDRAM PC 133
- 18Gb U-160 SCSI LVD68 7200rpm Hard Drive
- 1.44Mb 3.5" Floppy Drive
- 4Mb S3 Trio 32-3D/2X AGP Video Card
- Aopen HX08 300W ATX Full Tower Case
- Acer 104-Key PS/2 Keyboard
- Microsoft Trekker PS/2 Mouse
- 40X IDE CD-Rom Drive
- Intel EEPRO+ 10/100 PCI Ethernet
- Adaptec 19160 U-160 SCSI Card

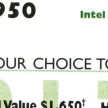


Illustration with optional TFT monitor

**Single PIII-800 $2,950**

## forté Millenium II Series

- Intel Pentium III 800 Processor
- ASUS CUV-4X VIA Chipset M'board
  - 128Mb SDRAM PC 133
- 20Gb 7200rpm IDE Ultra-66 HDD
  - 1.44Mb 3.5" Floppy Drive
- 32Mb Leadtek Winfast Geforce II MX V'Card
- Hitachi CM 615 17" .24 Monitor
  - Deluxe Midi Tower Case
- Logitech Internet PS/2 Keyboard
  - Logitech Wheel Mouse PS/2
- Pioneer 16X DVD, 40X CD-Rom Drive
- Creative Sound Blaster Live! Soundcard
  - Altec Lansing ACS-33 3-p
- 56K V90 Internal Fax/Data Modem
- Canon BJC-1000SP Printer
  - Acer 340 EPP Scanner
- Logitech Quickcam Express USB
- Lotus Millenium Smart Suite
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† *Special monitor pricing valid for system purchases only.*

## forté Palladium II Series*

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- PC Chips M'board
- 64Mb SDRAM PC 100
- 10Gb Ultra 66 IDE HDD
- 1.44Mb 3.5" Floppy Drive
- 8Mb Shared On-Board Video
- 250W ATX Midi Tower Case
- 104-Key Windows PS/2 Keyboard
- 2 Button PS/2 Mouse
- 40X CD-Rom Drive
- 16-bit 3D Sound On-Board
- 180W PMPO Stereo Speakers
- 56K V.90 Integrated Modem

| PRICES | | |
|---|---|---|
| Cel-667 | | $890 |
| Cel-733 | | $960 |
| Cel-766 | | $1,090 |
| PIII-800 | | $1,150 |
| PIII-866 | | $1,240 |

## forté Iridium II Series*

- Genuine Intel Processor
- Gigabyte GA-VXE7+ VIA Chipset M'board
- 64Mb SDRAM PC 133
- 10Gb Ultra 66 IDE Hard Drive
- 1.44Mb 3.5" Floppy Drive
- 8Mb S3 Trio 32-3D/2X AGP Video Card
- 250W ATX Midi Tower Case
- 104-Key Windows PS/2 Keyboard
- 2 Button PS/2 Mouse
- 40X IDE CD-Rom Drive
- Creative Sound Blaster PCI-128 Soundcard
- 600W PMPO Stereo Speakers
- 56K V90 Internal Fax/Data Modem
- Windows 98 / Millennium installed & conf.

| PRICES | | |
|---|---|---|
| Cel-667 | | $1,230 |
| Cel-733 | | $1,310 |
| Cel-766 | | $1,450 |
| PIII-800 | | $1,510 |
| PIII-866 | | $1,610 |

## forté Titanium II Series*

- Genuine AMD Duron or Intel Processor
- Gigabyte GA-72M or GA VXE7+ M'board
- 128Mb SDRAM PC 133
- 20Gb Ultra 66 IDE Hard Drive
- 1.44Mb 3.5" Floppy Drive
- 16Mb Diamond S3 S540 Video Card/ TV-Out
- 250W ATX Midi Tower Case
- Logitech Internet Keyboard PS/2
- Logitech Wheel Mouse PS/2
- 40X IDE CD-Rom Drive
- Creative Sound Blaster PCI-128 Soundcard
- 600W PMPO 3-p Sub Woofer
- 56K V90 Internal Fax/Data Modem
- Windows 98 / Millennium installed & conf

| PRICES | | |
|---|---|---|
| DURON-700 | | $1,530 |
| DURON-800 | | $1,620 |
| PIII-800 | | $1,750 |
| PIII-866 | | $1,840 |
| PIII-933 | | $2,090 |

## forté Platinum II Series*

- Genuine Intel Pentium III Processor
- ASUS CUSL2-C i815 Chipset M'board U-100
- 128Mb SDRAM PC 133
- 30Gb 7200rpm Ultra 100 IDE Hard Drive
- 1.44Mb 3.5" Floppy Drive
- 32Mb Leadtek Winfast Geforce II MX Video Card
- 250W ATX Midi Tower Case
- Microsoft Internet PS/2 Keyboard
- Microsoft Intellimouse PS/2
- LG 10X DVD, 40X CD-Rom Drive
- Creative Sound Blaster Live! Soundcard
- Altec Lansing ACS22 Stereo Speakers
- 56K V90 Internal Fax/Data Modem
- Windows 98 / Millennium installed & conf.

| PRICES | |
|---|---|
| Cel-667 | $2,130 |
| PIII-800 | $2,400 |
| PIII-866 | $2,490 |
| PIII-933 | $2,710 |
| PIII-1000 | $3,090 |

**For personal configurations, visit our website and select the System Builder**


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**Choose EASY-CONNECT PLUS for no compromise Fax reception on any Voice line!** Integrate Any Fax (or Modem) into any Telephone Line using your existing number and/or a FaxStream Duet number. Completely Automatic and Transparent operation, without Compromise. No special wiring, any device at any location.



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**Choose FMX-PRO when you wish to fit a Modem to your Fax line and the Modem also needs to receive data calls.** Directs Fax calls to your Fax and Data Calls to Modem. Barge-In protection is provided to prevent one device interrupting the other while it is in use.



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### MULTIPLE MODEMS

**Choose AUTO-SELECT when two or more Modems need to be connected to a Fax or dedicated Modem line.** Fit up to eight Modems, or seven Modems and one Fax to the same line. Incoming calls are automatically routed to any device. Barge-in protection is provided.



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INTERPHONE provides LOUD, CLEAR, telephone quality INTERCOM communication for 2 to 64 telephone handsets. Simply pick up any telephone and dial the desired telephone. InterPhone uses its own telephone cable, but does not connect to a Telecom line.



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## Turn ON, Turn OFF or RESET your PC, NETWORK or any ELECTRICAL device by TELEPHONE

### REMOTE TELEPHONE ACTIVATOR

RTA will allow you to call in on your telephone line and SWITCH ON, SWITCH OFF, or RESET up to 6 separate electrical appliances, PCs or Networks using a touch tone telephone and PIN Number. Our Line Sharing technology means you can use it AUTOMATICALLY, on any existing line.



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This low cost accessory for use with our RTA, is designed for quick and easy user fitting, direct to the back of ANY PC. Once fitted, you will be able to call in and RESET your PC from any Touch Tone Telephone, at any time, from anywhere in the world!



### POWER CONTROL UNIT

This RTA accessory provides you with a simple '2 minute plug in' solution for controlling remote electrical equipment. Once fitted, you will be able to call in and TURN ON, TURN OFF or RESET the power connected to any Electrical Device from any Touch Tone Telephone.



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### RINGMASTER STD

This compact low cost device allows any two Telephone devices to ring and communicate with each other, without the need to connect to Two Telecom lines. Save 25c per call. Ideal for the Testing, Training & Demonstration of all telephone devices. Operation is Bi-Directional.



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Provides all of the facilities of our PRO device and in addition generates TEN SEPARATE CALLING NUMBER DISPLAY (CND) test transmissions, in conjunction with any TELSTRA RING PATTERN. Alphanumeric and User Definable CND transmissions are also provided for.



Manufactured in Australia



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***Australia's Telephone Line Sharing Company***

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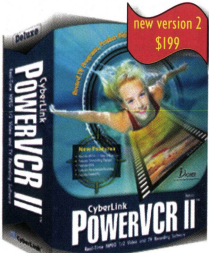
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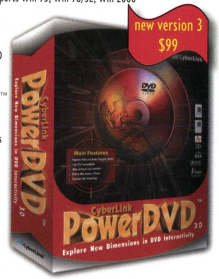



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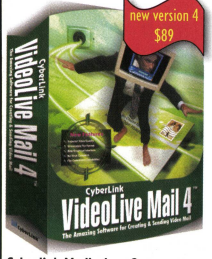

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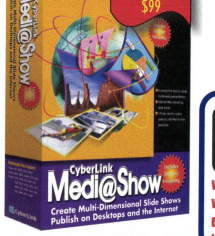
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RICOH
Image Communication

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Mounting screws, Audio cable

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**MP7083A**

**( Ricoh MP7083A Internal ATAPI CD-R/RW Drive )**

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CD-R/RW Drive

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1 Ricoh CD-R disc,
1 Ricoh High Speed CD-RW disc,
Setup Manual, Online manual,
Mounting screws, Audio cable

12x10x32x
Write ReWrite Read

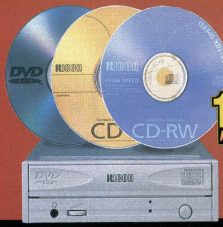



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1 Ricoh High Speed CD-RW media,
Quick start Instruction, Online manual,
Mounting screws, Audio cable

**MP9120A**

**( Ricoh MP9120A Internal ATAPI CD-R/RW & DVD ROM Driv**

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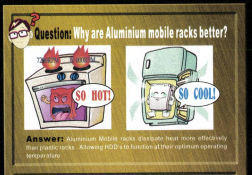
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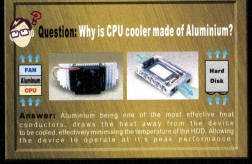
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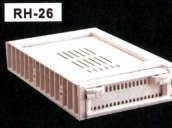



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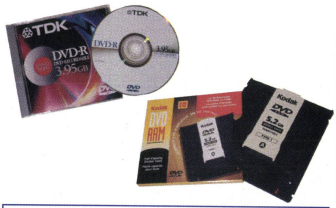
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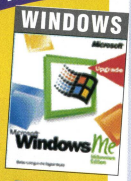
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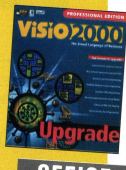
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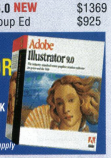

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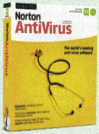


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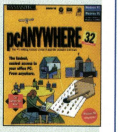

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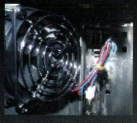
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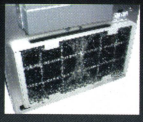
ATX MIDI TOWER CASE
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30.4 GB IBM / SEAGATE HARD DISK
32 MB GEFORCE II MX AGP VIDEO TV-OUT
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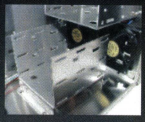
Rear fan cools your CPU



Twin front fans with dust filter



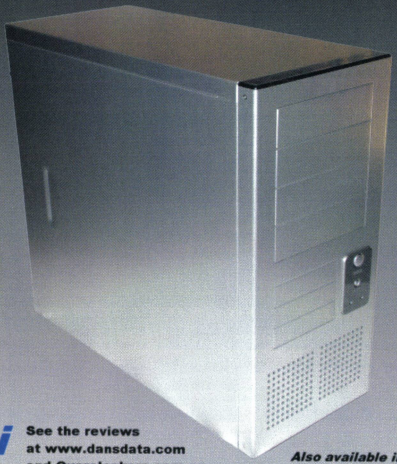
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Twin fans cool your hard drives

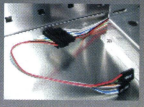


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| CANON BJ-300/ 330 | 7 | 4-BKL |
| CANON BJC-600/610/620 | 16 | 5-BKL |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21 | 9 | 18-BKL |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20 | 9 | 46-BKL |
| CANON BJC-3000/3000/6000/6500 | 6 | 8A-BKL |
| HP Desk Jet 400/500 Series | 6 | 8B-BKL |
| HP Desk Jet 600/660/690 Series | 6 | 29-BKL |
| HP Desk Jet 700/850C/855C/870C/890C/1000C Series | 8 | 7-BKL |
| HP Deskjet 300 Series & Olivetti JP'e! | 8 | 1-BKL |
| EPSON Stylus 400/800/800+/1000 | 8 | 2-BKL |
| EPSON Stylus Colour PRO/XL | 12 | 33-BKL |
| EPSON Stylus 820/colour II/IIs | 12 | 33A-BKL |
| EPSON Stylus Colour 200/300/400/500/600/800/850/1520 | 12 | 33B-BKL |
| EPSON Stylus Colour 440/460/640/660/700/740/760/900 | 6 | 35A-BKL |
| IBM/LEXMARK 40T6100/1020/2000/2030/2050 Series | 6 | 35B-BKL |
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| CANON BJC-210/250SP/240/255 | 3x12 | 25-CLR |
| CANON BJC-600/610/620 | 3x8 | 10-CLR |
| CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21 | 3x30 | 17-CLR |
| CANON BJC-3000/6000/6500 | 3x4 | 47-CLR |
| HP Colour Desk Jet 300/400/500 Series & Olivetti! | 3x12 | 14A-CLR |
| HP Colour Desk Jet 600C/660C/690C Series | 3x12 | 14B-CLR |
| HP Desk Jet 850C/855C/870C/1000C Series | 3x3 | 30A-CLR |
| HP Desk Jet 710/720/890 Series | 3x3 | 30B-CLR |
| EPSON Stylus Colour PRO/XL | 3x4 | 16-CLR |
| EPSON Stylus 820/colour II/IIs | 3x12 | 24-CLR |
| EPSON Stylus Colour 200/300/400/500/600/800/850/1520 | 3x12 | 34A-CLR |
| EPSON Stylus Colour 440/460/640/660/700/740/760/900 | 3x12 | 34B-CLR |
| IBM/LEXMARK 40T6100/1020/2000/2030/2050 Series | 3x6 | 36A-CLR |
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| HP Deskjet 600,660,670,690,692,694,695 SERIES | K2BK | 6/9 | K10CLR | 12 |
| HP Deskjet 710,720, 722,810,840, 890, 893, 930, 970 | K3BK | 6 | K22CLR | 6 |
| HP Deskjet 820,850, 855, 870, 1200, 1600 | K3BK | 6 | K11CLR | 6 |
| HP Deskjet, Deskwriter, Portable, Designjet, 300, 320 | K1BK | 6/9 | K9CLR | 12 |
| HP PHOTOSMART Series combined | | | K35CLR | 6 |
| Canon BJ -30, BJC-70, BJC-80 | K7BK | 60 | K1CLR | 30 |
| Canon BC-01, BC-02, BJC-1010 | K8BK | 7 | K2CLR | 12 |
| Canon BC-03, BC-3X ( fax ) BJC-210sp, 245, 255, 265, 1000 | K4BK | 9 | K2CLR | 12 |
| Canon BC-06 photo | | | K23CLR | 6 |
| BJ-300, 330 | K9BK | 7 | | |
| Canon BJC-600, 610, 620 | K10BK | 6 | K3CLR | 8 |
| Canon BJC-800, 820, 880 | K11BK | 12 | K4CLR | 12 |
| Canon BJC-2000 BC-20, BCI-21, BCI-21C | K12BK | 9/60 | K5CLR | 30 |
| Canon BJC-4000,4100,4200,4300,4550,5000,5500 BCI-21 | K12BK | 60 | K5CLR | 30 |
| Canon BJC-4000,4100,4200,4300,4550,5000,5500 BC-20 | K12BK | 9 | K5CLR | 30 |
| Canon BJC-5000/ 5500 (BC-23 only) | K27BK | 9 | K5CLR | 30 |
| Canon BJC-3000 / BJC-6000 / 6000 (BC-30 & BC-31) | K28BK | 12 | K35CLR | 6 |
| | | | K36CLR | 6 |
| Canon BJC 7000, 7100 BC-60, BC-61 | K19BK | 2 | K24CLR | 6 |
| Canon BJC 7000, 7100 photo BC-62 | | | K15CLR | 6 |
| Canon BJC 8200 | K32BK | 12 | K39CLR | 6 |
| Epson Stylus Color 800 / 1520 | K13BK | 12 | K20CLR | 12 |
| Epson Stylus Color 200 / 820 Color 11 / 11s | K16BK | 12 | K7CLR | 12 |
| Epson Stylus 400 / 800 / 800+ / 1000 | K14BK | 12 | K6CLR | 12 |
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| Epson Stylus Color 500 Not the same inks as the 400 / 600 | K17BK | 12 | K8CLR | 6 |
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| Epson Stylus Color 3000 / 5000 | K21BK | 3 | K34CLR | 3 |
| Epson Stylus Color 440 / 640 / 670 / 720 | K26BK | 12 | K40CLR | 12 |
| Epson Stylus Color 480 | K31BK | 12 | K40CLR | 12 |
| Epson Stylus Color 740 ( 900 & 1200 available ) | K6BK | 12 | K16CLR | 12 |
| Epson Stylus Color 750 & 1200 | K6BK | 12 | K16CLR | 12 |
| Epson Stylus Color 300 ( four colour cartridge ) | | | K33CLR | 9/12 |
| Lexmark/IBM 4076/5100/2030/2050/2070/1000 | K18BK | 6 | K18CLR | 6 |
| Lexmark/IBM 1100 / 2030 / 2050 waterproof | K24BK | 6 | K13CLR | 12 |
| Lexmark/IBM 2030 / 2050 photo | | | K29CLR | 12 |
| Lexmark/IBM 5000, 5700, 7000, Z11, Z31, Z51 (photo available ) | K25BK | 6 | K30CLR | 12 |
| Olivetti JP150/170/192/250/350/360/450/3100 | K20BK | 8 | K19CLR | 12 |
| Brother and Apple available | | | | |

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17" MITSUBISHI DV1725P 0.25P DIG MPR1 MON... — $495
17" MITSUBISHI DV1725P 0.26P DIG MPR1 MON... — $495
17" MITSUBISHI DV1725P 0.26P DIG MPR1 MON... — $652
17" VIEWSONIC E70 0.27P DIGITAL MONITOR... — $433
17" SONY N-L/R FD TRINITRON DIGITAL MON... — $726
17" SONY LCD FLAT PANEL DIGITAL MONITOR... — $5,644
19" N-L/R DIGITAL MONITOR OSD 1600*1200... — $878
19" SONY N-L/R FD TRINITRON DIGITAL MON... — $1,067
19" SONY N-L/R FD TRINITRON DIGITAL MON... — $1,361
21" MITSUBISHI DV2125P DIG MPR1 MONITOR... — $1,718
21" SONY N-I L/R FD TRINITRON DIGITAL MON... — $2,245

### NETWORK HUBS

10 BASE T 8 PORT ETHERNET HUB... — $69
10 BASE T 16 PORT ETHERNET HUB... — $74
100MBPS 8 PORT ETHERNET HUB LINKSYS... — $282
10 BASE T 8 PORT ETHERNET HUB... — $69
10MBPS 16 PORT ETHERNET HUB... — $337
100MBPS 16 PORT ETHERNET HUB LINKSYS... — $489

### KEYBOARDS & MICE — Phone

WIN95/98 104 KEY STD KEYBOARD... — $25
HONEYWELL K/B ENGLINE STD/EXTD... — $55
HONEYWELL K/B GENUINE MM EURO... — $56
MICROSOFT K/B NATURAL KEY... — $97
MICROSOFT K/B INTERNET WIN98 + OEM... — $97
MICROSOFT SIDEWINDER 3D PRO... — $97
MS MOUSE PS/2 & USB INTELLIEYE OPTICAL... — $83
MS MOUSE INTELLI EXPLORER PS/2 & USB... — $97
HONEYWELL MOUSE PS/2 & SERIAL 754... — $38

### PRINTERS HP- EPSON- CANON

HP 640 COLOR INK JET PRINTER A4... — $179
HP 640C COLOR INK JET PRINTER A4... — $273
HP 840C COLOR INK JET PRINTER A4... — $373
HP 870C COLOR INK JET PRINTER A4... — $564
HP 890C COLOR INK JET PRINTER A4... — $564
HP 970 CXI COLOR INK JET PRINTER A3... — $719
HP 1120C COLOR INK JET PRINTER A3... — $1,150
HP1100 LASER PRINTER 600DPI 8PPM A4... — $765
HP1100M LASER PRINTER 600DPI 8PPM A4... — $1,150
HP2100 LASER PRINTER 1200DPI 16PPM A4... — $1,335
HP OFFICE JET 1150C SCAN/COPY/PRN/FAX... — $746
HP OFFICE JET 955C SCAN/COPY/PRN/FAX... — $631
HP OFFICE JET 960C SCAN/COPY/PRN/FAX... — $910
EPSON STYLUS COLOR 480 COLOR/PRINTER... — $183
EPSON STYLUS COLOR 680 1440V720 USB&E... — $226
EPSON STYLUS COLOR 740 1440V720 USB&E... — $309
EPSON STYLUS COLOR 760 1440V720 USB&E... — $376
EPSON STYLUS COLOR 860 1440V720 USB&E... — $443
EPSON STYLUS COLOR 880 2880V720 USB&E... — $527
EPSON STYLUS COLOR 900 1440V720... — $658
EPSON STYLUS COLOR 980 2880V720... — $725

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### HDD

10G IDE - $210
20G IDE - $285
30G IDE - $395

### SCSI

9.1GSCSI - $510
18GSCSI - $785
36GSCSI - Call

### Notebook HDD

6GB - $315
10GB - $365
12GB - $419
15GB - $720

### CDRW

Sony
HP
Yamaha
Ricoh
Le Cie
Mitsubishi

### CD-ROM

Creative (IDE)
NEC (SCSI)
Fujitsu (IDE)

### CASES DESKTOP - TOWER - FULL - AT - ATX

AT MINI TOWER CASE LED LCD W PS... — $59
AT MINI DESKTOP CASE SLIM W PS... — $59
ATX MIDI TOWER CASE W PS... — $67
ATX MIDI FULL TOWER CASE DELUXE... — $145
ATX GALAXY MEDIVESK TOP DELUXE... — $145
ATX MIDI FULL TOWER CASE 300 WATT... — $145
EXTRA FAN COOLING FOR CASE FRONT... — $15

### CASES SLIMLINE - SFF - SMALL FORM FACTOR

SOLA UPS 325 SERIES 400VA WINNS/98... — $340
SOLA UPS 325 SERIES 700VA WINNS/98... — $565
SOLA UPS 325 SERIES 1000VA WINNS/98... — $804

### MISC DRIVES - LS120 - IOMEGA - JAZZ

LS 120 SUPER FLOPPY 120MB IDE DRV OEM... — $130
LS 120 SUPER FLOPPY 120MB IDE DRV RETAIL... — $139
IOMEGA ZIP DRV INT IDE 100MB OEM... — $145
IOMEGA ZIP DRV INT IDE 250MB OEM... — $212
IOMEGA ZIP DRV EXT 100MB USB... — $212
IOMEGA ZIP DRV INT IDE 250 EACH PC... — $212
IOMEGA ZIP DRV INT IDE 250MB RETAIL... — $212
IOMEGA ZIP DRV EXT 250MB USB... — $270
IOMEGA ZIP DRV EXT 250MB PARALLEL... — $270
IOMEGA JAZZ DRV EXT/INT SCSI 2GIG W/96... — $690
IOMEGA JAZZ DRV EXT/INT SCSI 2GIG W/USB... — $690

### MULTIMEDIA - CD 40 - 50 SPD & DVD

32 SPD CD ROM CARD - AUDIO STD... — $24
CREATIVE VIBRA 128 SOUND CARD OEM... — $41
CREATIVE SOUNDBLASTER 1345 VALUE OEM... — $110
CREATIVE SOUND BLASTER 'LIVE' OPTICAL... — $420
40 SPD - 12X/32X/40X/10X IDE CDRW ONLY... — $140
48 SPEED CD-ROM DRIVE SONY/PANASONIC... — $75
52 SPEED CD-ROM DRIVE MITSUBISHI... — $75
PIONEER 16X/DVD (4X/2X) TRAY DRV & S/W... — $240
MITSUBISHI 16X/DVD (4X/2X) DVD-ROM DRV... — $240
SAMSUNG 12x/DVD DVD-ROM DRV ONLY... — $170
CREATIVE DVD 5X/32X/40X/10X MPEG2 DVD... — $145
REALMAGIC DVD DECODER CARD MPEG-2 PCI... — $145
SONY 32X/10X/40X IDE CDRW OEM... — $164
PROKIT SONY 32X/6X/40X IDE CD-RW KIT... — $328
PROKIT SONY 32X/10X/40X SCSI CD-RW KIT... — $328
SONY 32X/6X/40X INT. IDE DRIVE ONLY... — $328
SONY 32X/10X/40X INT. IDE DRIVE ONLY... — $328
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SHINTANO CDRW1610 IDE 32x10x4 SONY KIT... — $463
RICOH 2040iw/6Rw/40x INT IDE CD-RW KIT... — $551
RICOH 32X/6Rw/40x INT IDE CD-RW KIT... — $551
SOTO 120 CD SPEAKERS 340V... — $33
COMPRO 380 WATT 2/0V SPEAKERS... — $54
ALTEC LANSING ACS31 SUB KIT... — $126
ALTEC LANSING ACS45 1 SUB KIT... — $226
ALTEC LANSING ACS54 GAMER SUB KIT... — $301
ALTEC LANSING ACS56 GAMER SUB KIT... — $376
SONY MVC-FD73 200M DIG CAMERA... — $443
SONY MVC-FD85 200M DIG CAMERA... — $1,349
SONY MVC-FD95 200M DIG CAMERA... — $2,144
SONY DSC530 CYBERSHOT DIGITAL CAMERA... — $1,104
SONY DSC570 CYBERSHOT DIGITAL CAMERA... — $1,704
KODAK DVC-325 DIGITAL VIDEO CAMERA USB... — $1,144
KODAK EZ200 FUN DIG CAM & VID CONF... — $227
OLYMPUS C-2020 ZOOM DIGITAL CAMERA... — $823
OLYMPUS 920 200M DIGITAL CAMERA... — $504
KODAK DC-280 ZOOM DIGITAL CAMERA... — $928
KODAK DC-290 ZOOM DIGITAL CAMERA... — $1,265
KODAK DC-3400 ZOOM DIGITAL CAMERA... — $864
KODAK DC-4800 ZOOM DIGITAL CAMERA... — $1,477
KODAK USB COMPACT FLASH CARD READER... — $100
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USB CONTROLLER CARD 2 x USB PORTS... — $38
4-PORT USB HUB WITH POWER... — $63

### MODEMS 56.6 STD - 56.6 HIGH END — Phone

56.6 INTERNAL VOICE/FAX/DATA PCI STD... — $63
56.6 EXTERNAL VOICE/FAX/DATA STD... — $107
56.6 INTERNAL V.PD WITH COMMON MEGA I MODEM... — $109
56.6 FAX/DATA MODEM... — $109
NETCOMM 56K FAX/SVD ULTRA II V56... — $193
NETCOMM 56K FAX/SVD ULTRA II V56 EXT... — $193
BIANCA/BRIVE 56.6K MODEM SP56K V.90... — $192

### OTHER - FAN - WHEEL - P.SUPPLY - CPU

6x86-P/P77 AMD HS FAN HEAVY DUTY... — $18.81
INTERNAL 3.5 INTERNAL MEDIA TAMB... — $9.31
BLANK CD'S FROM - KODAK GOLD 74... — $2.03
BLANK CD'S FROM - PRINCO 74 MIN... — $1.35
BLANK CD'S FROM - PRINCO 74... — $1.35
BLANK CD'S FROM - PRINCO 74... — $1.93
MS WORKS SUITE 2000 WITH WORD ETC... — $109
WINDOWS MILLENNIUM EDITION WITH ONLY PH OEM... — $212
WINDOWS 2000 PRO WITH ONLY PH OEM... — $326
NE2000 COM. PCI/ISA COMBO CARD... — $29
NETCOMM 10/100 COMM. PCI NIC... — $52
ETHERNET 10MBPS PCI CARD LINKSYS... — $60
PCMCIA ETHERNET CARD 10 MB... — $97
PCMCIA ETHERNET CARD 10/100... — $143
PARSIE ULTRA 56K INTERNAL MODEM PCI... — $109
PROMISE ULTRA 100 CONTROLLER PCI... — $109

### SYSTEM CASE - IMAC - 10000 B & G

ATEC 350 WATT/CASE/PS 2/350K - INDIGO... — $1,593
IMAC DV 400 64/10G/CDF/WIRELS/12/56K/1 B & G... — $1,983
IMAC DV SE 500 128/30G/DVD/F WIRELS/12/56K/ 1B & G... — $2,424
IMAC DV SE 500 128/30G/DVD/F WIRELS/12/56K GA/3NW... — $2,958
IMAC DUAL USB 500/128/30G/DVD/F/WIRELS/56K/PERSIS... — $3,451
ROCK 300 64/5G/8/12.1" TFT/CD/Ext... — $2,987
ROCK 400 128/10G/DVD/F/WIRELS/56K/CD/W/KEY... — $3,597

### SYSTEMS K6 - MMX - PENTIUM III

CYRIXMII 6P-733 - 133 - 60MB/2.1G/21.6GMB/2.1G PC100 MSBELMR AT ... — $1,024
AMD K6 II P-500 3D 64MB/2.1G PC100 MSBELMR AT ... — $1,086
INTEL CELERON 600A 64MB/2.1G PC100 MSBELMR AT ... — $1,202
INTEL CELERON 600A/ 64MB/ ATX ASUS MB... — $1,202
AMD DURON 700MHz, 64MB ATX ASUS MB... — $1,352
AMD ATHLON K7-P700 64 MB ATX ASUS MB... — $1,515
AMD THUNDERBIRD K7- P750 64 MB ATX ASUS MB — $1,491
AMD THUNDERBIRD K7- P800 64 MB ATX ASUS MB... — $1,515
PENTIUM III 733/64MB, 10.2- 4MB AGP S/C, ATX... — $1,464
PENTIUM III 866/64MB, 10.2-4MB AGP S/C, ATX... — $1,615
PENTIUM III 866/64MB 10.2, 4MB AGP, S/C, ATX... — $1,542

### SYSTEMS K6 - MMX - PENTIUM III

- SYSTEM INCLUDES:
- ASSEMBLY/10.2 GB HD... AT-ATX CASE...
- 64 MB SDRAM 168PIN 100MHZ SDRAM DIMM...
- 64 MB SD...ON BOARD VIDEO & PCI S/C & SPKS...
- 15" N-I L/R DIGITAL MONITOR OSD 1600*1200...
- KEYBOARD, MOUSE, ALL MANUALS & DRV CD'S...
- * ATHLON SYSTEMS ASUS MB & ATTE CASE...
- * ATHLON SYSTEMS ASUS MB & ATTE CASE...
- * PENTIUM III SYSTEMS P3, 133 MHZ SLOT A & ATTE CASE...
- WARRANTY ON-SITE 1 YR. $4000.00... — $65
- WARRANTY ON-SITE 2 YRS. $4000.00... — $127

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Sat/ 4100/CDT,6000C,64MB,13.3"TFT,6GB,CD,56K,W98... — $3,923
Sat/ 4320/DVD,6000*3,64MB,13.3"TFT,10GB,DVD,56K... — $4,137
Sat/ 4360/DVD,7000*3,64MB,14.1"TFT,12GB,DVD,56K,W... — $5,317
Sat/ 4360/DVD,7500*3,64MB,14.1"TFT,20GB,DVD,56K,W98... — $5,317
Tecra 8100,750P,128MB,14.1"TFT,20GB,DVD,56K,W98... — $7,802

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* **128MB PC133SDRAM**
* **20GB ATA 66 HD**
* **32MB TNT2 M64 V/C**
* **SOUND BLASTER 128**
* **40 x ACER CD-ROM**
* **1.44 FLOPPY DRIVE**
* **15" ACER MONITOR**
* **WIN 98 KEYBOARD**
* **FAST MOUSE**
* **120W SPEAKER**

### Thunderbird 700/800

**$1859/1949**

* **ASUS A7V MB**
* **128MB PC133SDRAM**
* **20GB ATA66 HD**
* **32MB TNT2 M64 V/C**
* **SB LIVE VALUE S/C**
* **40 x SONY CD-ROM**
* **1.44 FLOPPY DRIVE**
* **17" ACER MONITOR**
* **WINN98 KEYBOARD**
* **FAST MOUSE**
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|---|---|
| Celeron 600 | $185 |
| Celeron 633 | $210 |
| Pentium III 700 | $380 |
| Pentium III 733 | $420 |
| Pentium III 750 | $460 |
| Pentium III 800EB | $510 |
| Pentium III 866 | $660 |
| AMD K6II 500 | $130 |
| AMD Duron 650 | $240 |
| AMD Duron 700 | $320 |
| Thunderbird 700 | $350 |
| Thunderbird 800 | $370 |

### Hard Drive

| | |
|---|---|
| 7.5GB WD | $150 |
| 10.2GB Fujitsu | $170 |
| 15GB Quantum | $240 |
| 20GB Quantum | $210 |
| 20GB IBM ATA100 | $220 |
| 30GB Quantum | $270 |
| 41GB IBM ATA100 | $355 |
| 15GB IBM 7200 | $400 |
| 15GB Seagate 7200 | $215 |
| 20GB Seagate 7200 | $255 |
| 20GB Quantum 7200 | $280 |
| 30GB IBM 7200 | $320 |
| 30GB IBM 7200 | $345 |
| 45GB IBM 7200 | $500 |
| 60GB/75GB IBM 7200 | CALL |

### RAM

| | |
|---|---|
| 16MB EDO RAM | $60 |
| 32MB EDO RAM | $110 |
| 32MB SD PC100 | $90 |
| 64MB SD PC133 | $120 |
| 128MB SD PC133 | $215 |
| 256MB SD PC133 | CALL |
| **Kingmax** available | CALL |

### Case

| | |
|---|---|
| Midi Tower ATX | $40 |
| Midi Tower ATX | $70 |
| Full Tower ATX | $110 |
| Aspen KP45 | $95 |
| Aspen HQ45 | $125 |
| Aspen HQ65 | $125 |
| Aspen HQ66 | $200 |

### Motherboard

| | |
|---|---|
| Asus CUSL2 | $235 |
| Asus A7V | $305 |
| Abit BE6 Intel815E | $205 |
| Abit KT7 Raid | $310 |
| Gigabyte 6VXE7+ | $185 |
| Gigabyte 6VXC7-4X | $185 |
| Gigabyte 6WMMC7-1 | $175 |
| Gigabyte 7ZX | $225 |
| Gigabyte 7ZX w SB128 | $280 |
| Gigabyte 6OMM | $195 |

### CD-Writer

| | |
|---|---|
| Creative 32/8/4 (Japan) | $295 |
| LG 32/8/4 IDE Retail | $250 |
| Ricoh 32/8/4 IDE | $320 |
| Ricoh 24/10 IDE | $400 |
| Sony 32/8/4 140E | $305 |
| Sony 32/8/4 140S | $355 |
| Sony 32/10/4 145E | $365 |
| Sony 32/10/4 145S | $435 |
| HP 32/8/4 IDE | $450 |
| Yamaha 24/8/4 Scsi Re | $440 |

### CD/DVD-ROM

| | |
|---|---|
| 40 x Acer CD-ROM | $69 |
| 48 x Sony CD-ROM | $75 |
| 32 x Teac Scsi CD-ROM | $140 |
| 8 x Panasonic DVD | $160 |
| 10 x Pioneer DVD | $235 |
| 16 x Pioneer DVD Slot | $245 |
| Magic Decoder Card | $130 |

### Keyboard

| | |
|---|---|
| Microsoft Internet + MS | $65 |
| Microsoft Natural Pro | $95 |
| Logitech Internet | $45 |
| Logitech Cordless + MS | $130 |
| Honeywell Spacesmart | $40 |
| Honeywell Internet | $60 |

### Mouse

| | |
|---|---|
| Microsoft Intellieye | $30 |
| Microsoft Intellimouse | $75 |
| Microsoft Explorer | $98 |
| Logitech Scroll Wheel | $30 |
| Logitech Cordless | $60 |

### VGA Card

| | |
|---|---|
| 8MB AGP / PCI | $45/$65 |
| 16MB Diamond Stealth6 | $90 |
| 16MB Viewsonic 2000 AGP | $169 |
| 16MB Viewsonic 2000 PCI | $165 |
| 16MB Viewsonic 3000 AGP | $239 |
| 16MB Viewsonic 3500 AGP | $330 |
| 32MB TNT2 M64 AGP | $135 |
| 32MB TNT2 M64 PCI | $150 |
| 32MB TNT2 M64 TV Out | $260 |
| 32MB Sparkle GeforceII MX | $230 |
| 32MB Matrox G400 SH | $295 |
| 32MB Matrox G400 DH | $320 |
| 32MB Matrox G400 MAX | $430 |
| 16MB Matrox Marvel TV | $659 |
| 32MB Asus 7100 MX TV | $340 |
| 32MB Asus 3800 Ultra | $540 |
| 32MB Asus 6600 Deluxe | $429 |
| 32MB Asus 6800 Deluxe | $619 |
| 32MB Asus 7700 Pure | $589 |
| 32MB Asus 7700 Deluxe | $659 |
| 32MB Winfast Geforce DDR | $429 |
| 32MB Winfast Geforce4 TV | $615 |
| 32MB Creative Geforce2 | $585 |
| 64MB Asus 7700 Pure | $740 |
| 64MB Asus 7700 Deluxe | $840 |
| 64MB Voodoo5 5500 | $590 |
| Pixelview TV | $125 |

### Sound Card

| | |
|---|---|
| 16bits ISA Sound Card | $20 |
| 32bits PCI Sound Card | $30 |
| Creative Vibra 128 | $45 |
| Creative Live Value | $100 |
| Creative Live Player | $150 |
| Creative Live Platinum | $380 |

### Speaker

| | |
|---|---|
| 160W Multimedia Speaker | $15 |
| 600W Multimedia Speaker | $65 |
| 600W Juster Subwoofer | $65 |
| 800W Wood Subwoofer | $65 |
| Creative PC Works | $30 |
| Creative FPS 1000 | $155 |
| Creative FPS 2000 | $300 |
| Altec Lansing 54 | $190 |
| Altec Lansing 56 | $255 |

### 56K V.90 Modem

| | |
|---|---|
| ABC Ext. / Int. | $90 |
| Netcom Ext. / Int. | $90 |
| Swansmart Ext. / Int. | $90 |
| HP U3260 Int. | $80 |
| Acer External | $90 |
| Creative External | $100 |
| Banksia Wave Ext. | $175 |
| U.S.Robotics Message | $166 |
| Kingmax PCMCIA | $130 |

### Networking

| | |
|---|---|
| 10, 10/100 Net Card | $20/30 |
| Swann 4port USB Hub | $50 |
| 3port 10base Hub | $55 |
| 8port 10base Hub | $65 |
| 7port USB Hub | $80 |
| 5port 10/100 Hub | $145 |
| 8port 10/100 Hub Switch | $190 |
| Kingmax PCMCIA 10 | $70 |
| Kingmax PCMCIA 10/100 | $130 |

### Web Cam

| | |
|---|---|
| Logitech USB | $75 |
| Acer USB Webcam | $120 |
| Kodak DC-325 | $125 |
| Creative Webcam3 | $125 |
| Creative Webcam go! | $265 |
| Creative Webcam go Plus | $290 |

### Storage

| | |
|---|---|
| Zip 100MB Internal | $125 |
| Zip 250MB Internal | $195 |
| Zip 100MB Ext. IDE | $190 |
| Zip 250 MB Ext. IDE | $290 |
| Zip 250MB Ext. USB | $315 |
| Zip 250MB Scsi | $125 |
| Orb Internal Drive | $295 |
| Orb External IDE / Scsi | $540 |

### Blank CD/Disk

| | |
|---|---|
| Pioneer 650MB | $1.50 |
| Kodak Gold 650MB | $1.90 |
| Kodak Gold 650MB | $2.00 |
| Olympic 700MB | $1.40 |
| BASF 700MB | $1.60 |
| Fuji 700MB | $18 |
| 3Sixty 700MB | $28 |
| 3Sixty 650MB | $17 |

### Monitor

| | |
|---|---|
| 14" Acer | $250 |
| 15" Viewsonic E651 | $255 |
| 15" Philips 105S | $265 |
| 17" Acer | $305 |
| 17" LG 775N | $370 |
| 17" Hitachi CM615 | $400 |
| 17" Philips 107S | $400 |
| 17" Mitsubishi 170 | $395 |
| 17" Mitsubishi 1772 | $485 |
| 17" Mitsubishi 17NF | $655 |
| 19" Sony E20 | $920 |
| 19" Aurigia SF..22 | $940 |
| 19" Philips 109S | $910 |
| 19" Mitsubishi 1995 | $930 |
| 19" Sony G400 | $1280 |

### Printer

| | |
|---|---|
| Canon BJC 2100 | $180 |
| Canon BJC 3000 | $240 |
| Canon LBP800 Laser | $475 |
| Epson Stylus 580 | $215 |
| Epson Stylus 680 | $265 |
| Epson Stylus 760 | $330 |
| Epson Photo 720 | $390 |
| Epson Stylus 1270 | $785 |
| HP Color 640C | $170 |
| HP Color 600C | $270 |
| HP Color 800C | $380 |
| HP Laser 1100 | $680 |
| HP Officejet G85 | $280 |
| HP Officejet G85 | $1280 |

### Scanner

| | |
|---|---|
| Canon 640P | $180 |
| Canon 650U | $185 |
| Canon 1220U | $280 |
| HP 3300C | $185 |
| HP 3400C | $280 |
| HP 4200C | $230 |
| HP 5300C | $440 |
| Acer 640U | $140 |
| Acer 640UT | $270 |
| Epson 610U | $230 |
| Plustek U12B | $105 |
| Plustek UT12 | $155 |

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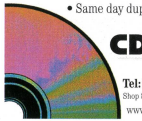
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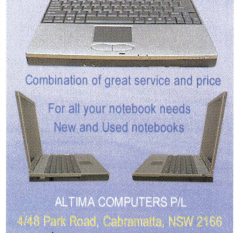


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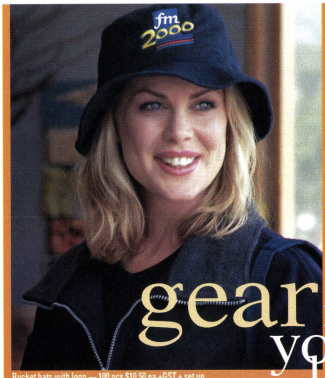



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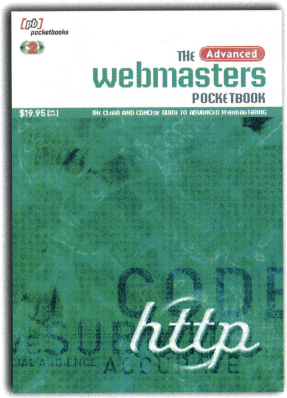
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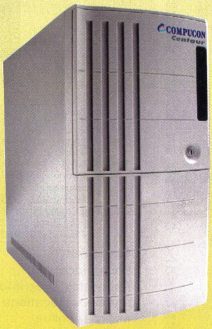
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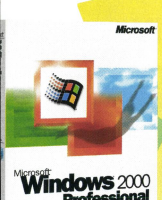
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***e new Microsoft Operating System for home use***

*System Restores* lets you easily return your system to a working state in the event of a significant problem, so you can quickly get back to using your PC.

With *Windows Image Acquisition*, you can easily import photos from scanners and cameras. No extra software is required to perform simple operations like previewing, rotating and printing.

*Microsoft Movie Maker* gives you the power to create, edit and share movies over the Internet.

*Windows Me* includes built-in safeguards that help prevent you (or applications) from deleting or overwriting key system files.

Internet Explorer 5.5 provides the richest online experience with easy search capabilities, faster browsing and easier printing.

*Windows Me* is ready for home networking. You can easily set up a home network through your PC, and share printers, Internet connections and other devices.




**Windows® Millenium Edition Promotional Step Up for Windows 98 Users** (A3688) GST INC: **$99**




**Windows® Millenium Edition Upgrade** (A3687) GST INC: **$190**




**Windows® Millenium Edition Full Version** (A3686) GST INC: **$319**

* No further discounts apply

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# TOSHIBA

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## Power & Affordability

**Toshiba Install Options**
*For a small extra charge we can install your chosen options into your new Toshiba eg: more memory. Call for more information.*

**TOSHIBA Battery Packs**
For Satellite 4000/ 4010/2520CDT & others (21930) GST INC **$127**
For Portégé 3010/ 3020 (Lithium Ion) (73665) GST INC **$120**
For Tecra 8000 (Lithium Ion) (29358) GST INC **$237**

**TOSHIBA High Capacity Battery Packs**
For Portégé 3010/ 3020 (72475) GST INC **$237**
For Portégé 7000/ 7020 (66479) GST INC **$280**

**TOSHIBA Battery Charger**
For Tecra 8000 (29357) GST INC **$190**

**TOSHIBA Universal AC Adapter**
For Tecra 8000/Satellite 4000/4010 & others (44200) GST INC **$104**

## Satellite 30CDT

NEW




The Satellite series is the ideal notebook for small and medium business, corporate projects and consumers providing the most CPU/Dollar from a major vendor without compromising features. This Satellite features a Celeron 500MHz CPU, 64MB Ram, 10GB Hard Disk, Windows® 98SE, 12.1" Active Matrix TFT Screen, 56KB Modem in an all new case.

(B2350) GST INC

**$3,659**##

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Available While stocks Last #SpeedStep

## Compare Satellite Models

| | Satellite 2250CDT | | Satellite 30CDT |
|---|---|---|---|
| Processor | Celeron 600MHz | NEW!! | Celeron 500MHz |
| RAM Std/Max | 64/192 MB | | 64/192 MB |
| Hard Disk | 6GB | | 10GB |
| Screen | 12.1" TFT | | 12.1" TFT |
| CD-ROM | 24xCD-ROM | NEW!! | 24xCD-ROM |
| Mic & Spkr | Speakers | | Speakers |
| Port replicator | No | NEW!! | No |
| Select bay | No | | No |
| DVD capable | No | | No |
| Weight | 3.17 kg | NEW!! | 2 kg |
| Warranty | 1 Year | | 1 Year |
| 56K v.90 modem | Yes | | Yes |
| **RENT*** | **$27.40** | | **$35.88** |
| **GST INC** | **$2,794**## | | **$3,659**## |
| With Windows 98SE | (A2849) | | (B2350) |

JAN 4

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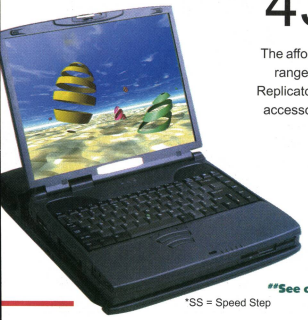
# TOSHIBA

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## Perfect Solution for Business Professionals

# Satellite Pro 4310XCDT



The affordable high performance mobile computer. With a range of expansion capabilities, including optional Port Replicator for easy connection to desktop peripherals and accessories, Satellite Pro is the perfect, no-compromise solution for business professionals.

(A2854) GST INC

**$3,395****

*SS = Speed Step

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**TOSHIBA EDO Memory Upgrades**

32MB for Tecra 8000 (not for PIII models)/ Portégé7000/ Satellite 4000 (29356) GST INC **$205**

32MB for Portégé 3110 (81078) GST INC **$189**

64MB for Tecra 8000 (not for PIII models)/ Portege7000/ Satellite4000 (67234) GST INC **$235**

64MB for Portégé 3020 (77229) GST INC **$366**

**TOSHIBA Additional 2 Year Warranty**

For Satellites with TFT Display (21729) GST INC **$320**

## Compare Satellite Pro Models

| | Satellite Pro 4310XCDT | Satellite Pro 4320DVD | Satellite Pro 4340XDVD | Satellite Pro 4360XDVD | Satellite Pro 4380XDVD |
|---|---|---|---|---|---|
| Processor | Celeron 600MHz | Pentium III 600MHzSS* | Pentium III 650MHzSS* | Pentium III 700MHzSS* | Pentium III 750MHzSS* |
| RAM Std/Max | 64/320 MB | 64/320 MB | 64/320 MB | 64/320 MB | 64/320 MB |
| Hard Disk | 6GB | 10GB | 12GB | 12GB | 12GB |
| Monitor | 13.3" TFT | 13.3" TFT | 14.1" TFT | 14.1" TFT | 14.1" TFT |
| CD-ROM | 24xCD-ROM | DVD | DVD | DVD | DVD |
| Mic & Spkr | Yes | Yes | Yes | Yes | Yes |
| Port replicator | Optional | Optional | Optional | Optional | Optional |
| Video Ram | 8Mb | 8Mb | 8Mb | 8Mb | 8Mb |
| DVD capable | No | Inc 6xDVD | Inc 6xDVD | Inc 6xDVD | Inc 6xDVD |
| Weight | 3.17 kg | 3.17 kg | 3.17 kg | 3.17 kg | 3.17 kg |
| Warranty | 1 Year | 1 Year | 1 Year | 1 Year | 1 Year |
| 56K V.90 modem | Yes | Yes | Yes | Yes | Yes |
| RENT* | $33.29 | $36.68 | $43.31 | $45.60 | $49.04 |
| OST INC with Windows 95/98 | $3,395** (A2854) | $3,925** (B0082) | $4,635** (B2352) | $4,880** (A2995) | $5,380** (A2856) |
| RENT* | $35.11 | $38.05 | $45.09 | $46.29 | $50.86 |
| OST INC with Windows 2000/NT4 | $3,580** (A2855) | $4,072** (B0083) | $4,825** (B2354) | $5,079** (A2996) | $5,580** (A2857) |

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## Power & Affordability

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**TOSHIBA Battery Packs**
For Satellite 4000/ 4010/2520CDT & others (21930) GST INC **$118**
For Portégé 3010/ 3020 (Lithium Ion) (73665) GST INC **$136**
For Satellite 4000 Series (72109) GST INC **$120**
For Tecra 8000 (Lithium Ion) (29358) GST INC **$237**

**TOSHIBA High Capacity Battery Packs**
For Portégé 3010/ 3020 (72475) GST INC **$237**
For Portégé 7000/ 7020 (66479) GST INC **$280**

**TOSHIBA Battery Charger**
For Tecra 8000 (29357) GST INC **$209**

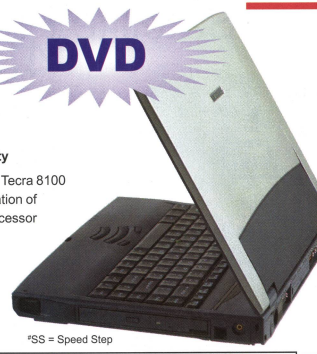
**TOSHIBA Universal AC Adapter**
For Tecra 8000/Satellite 4000/4010 & others (44200) GST INC **$104**

# Tecra 8100

DVD

- Pentium III 600MHz SS
- 14.1" TFT
- 64MB RAM
- 12GB HDD
- 6 x DVD
- 3 Year Warranty

Styled for consistant mobile performance, the Tecra 8100 series provides you with the ultimate combination of traditional Tecra investment benefits, high processor performance and a new sleek look and feel.



(94185) GST INC

**$5,299**##

#SS = Speed Step

## Compare Tecra 8100 Models

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| | Tecra 8100 | Tecra 8100 | Tecra 8100 | Tecra 8100 |
|---|---|---|---|---|
| Processor | Pentium III 600MHzSS# | Pentium III 700MHzSS# | Pentium III 750MHzSS# | Pentium III 850MHzSS# |
| RAM Std/Max | 64 MB | 128 MB | 128 MB | 128 MB |
| Hard Disk | 12GB | 12GB | 20GB | 20GB |
| Screen | 14.1" TFT | 14.1" TFT | 14.1" TFT | 14.1" TFT |
| CD-ROM | 24x CD-ROM | 24x CD-ROM | No | No |
| Mic & Spkr | Speakers | Speakers | Speakers | Speakers |
| Port replicator | Optional | Optional | Optional | Optional |
| Select bay | Yes | Yes | Yes | Yes |
| DVD capable | 6 x DVD | 6 x DVD | 6 x DVD | 6 x DVD |
| Weight | 2.8 kg | 2.8 kg | 2.8 kg | 2.8 kg |
| Warranty | 3 Years | 3 Years | 3 Years | 3 Years |
| 56K V.90 modem | Yes | Yes | Yes | Yes |
| **RENT*** | $48.30 | $58.00 | $63.58 | $69.15 |
| **GST INC** With Windows 95/98 | **$5,299**## (94185) | **$6,685**## (A2868) | **$7,328**## (A2863) | **$7,970**## (B0084) |
| **RENT*** | $50.12 | $59.85 | $65.32 | $70.41 |
| **GST INC** With Windows 2000/NT4 | **$5,499**## (94186) | **$6,898**## (A2869) | **$7,529**## (A2864) | **$8,115**## (B0085) |

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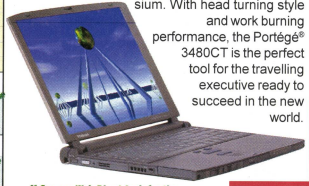
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## Compare Ultra Portable Porteges

| | Portégé 3480CT | Portégé 7220CTe |
|---|---|---|
| Processor | PIII 600MHz | PIII 650MHz |
| RAM Std/Max | 64/192 MB | 64/192 MB |
| Hard Disk | 12GB | 12GB |
| Screen | 11.3" TFT | 13.3" TFT |
| Display | 1024x768 | 1024x768 |
| CD-ROM | Optional | Optional |
| Mic & Spkr | Yes | Yes |
| Port replicator | Optional | Optional |
| Select bay | No | No |
| LAN | Yes | Optional |
| DVD capable | Yes | Yes |
| Weight | 1.6 kg | 2 kg |
| Warranty | 3 Years | 3 Years |
| *56K V.90 modem* | Yes | Yes |
| RENT* | $45.65 | $54.43 |
| GST INC | $4,885 | $5,972** |
| With Windows 95/98 | (A5779) | (A2839) |
| RENT* | | $54.82 |
| GST INC | | $6,015** |
| Windows 2000/NT4 | (N/A) | (A7020) |

## Portégé 3480CT

The Portégé® 3480CT is the ultimate statement in mobile computing with its Pentium® III power, large high resolution colour display, long battery life and easy functionality all packed into an ultra thin lightweight body finished in sleek magnesium. With head turning style and work burning performance, the Portégé® 3480CT is the perfect tool for the travelling executive ready to succeed in the new world.



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*SS = Speed Step

**Toshiba Install Options**

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**TOSHIBA Battery Packs**
For Satellite 4000/4010/ 2520CDT & others (21930) GST INC **$118**
For Portégé 3010/3020 (Lithium Ion) (73665) GST INC **$136**
For Satellite 4000 Series (72109) GST INC **$118**
For Tecra 8000 (Lithium Ion) (29358) GST INC **$258**

**TOSHIBA High Capacity Battery Packs**
For Portégé 3010/3020 (72475) GST INC **$258**
For Portégé 7000/7020 (66479) GST INC **$295**

**TOSHIBA Battery Charger**
For Tecra 8000 (29357) GST INC **$295**

**TOSHIBA Universal AC Adapter**
For Tecra 8000/ Satellite 4000/4010 & others (44200) GST INC **$125**

## Blue Tooth

### oshiba Brings First Bluetooth PC ard Solution to Market

shiba's wireless solution empowers rtable computer users to unplug m the restraints of nventional wired computing th a fully integrated Bluetooth C Card, complete with SPANworks oductivity software.

sing short-range wireless radio mmunication, Bluetooth technology cilitates fast and secure transmission of both ice and data at speeds of up to 1 Mbit/s, which is to 20 times faster than a standard V.90 modem nnection. Utilising this revolutionary wireless technology, Toshiba's Bluetooth PC Card can be used to nnect portable computers, printers, digital mobile phones, PDAs, digital cameras, network access points d other mobile devices to one another and connect to the Internet or a LAN without the need for wires or bles. Many of these products will be available by calendar Q1 2001.




(xxxx) GST Inc **$Call**

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# Small Business Networking is Easy with

## Compaq Neoserver 150

**Compaq Monitors**

15" S510 Monitor (A0067) GST Inc **$374**

17" S710 Monitor (97852) GST Inc **$559**

19" S910 Monitor (93804) GST Inc **$929**

Compaq's NeoServer 150 is the right server appliance for small businesses who need reliability and simplicity, with room to grow! • Ready-to-go, All-In-One small business server • Easy to Set-up, Easy to manage • Integrated operating system Included • Boost productivity:File and Peripheral Sharing • Built-in secure firewall • Local and Internet Email • High speed Internet access port • Internal Company Web site • Automatic Removable Backup • Wireless Networking (optional) • Grows with the business (up to one hundred users on the network.) • Peace of mind with a full year replacement warranty

| Processor | Celeron |
|---|---|
| Speed | 500 Hz |
| RAM | 64 MB |
| Hard Disk | 13 GB |
| Monitor | Not required |
| Modem | 56 K |
| Op System | Provided |
| Part N° | (A0268) |
| Rent 3 Yrs* | $26.16 |
| GST Inc | $2,668 |



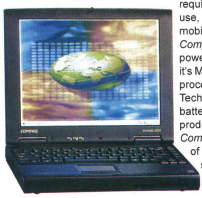
## Compaq Armada 100S

The *Compaq Armada* 100S series of notebooks have been created specifically to answer the needs of small business, at a price point that is sure to make you take notice. These impressive new portables are designed for growing business users w

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require a dependable, easy-to-use, and affordably priced mobile computing solution. The *Compaq Armada* 100S delivers powerful performance through it's Mobile AMD K6®-2+ 533MHz processor with 3D Now! Technology, industry-leading battery life, out-of-box business productivity and software. The *Compaq Armada* 100S is an out of the box ready-to-run system with the pre-installed software you need to get to work fast!

| Processor | AMD K6-2+ | AMD K6-2+ |
|---|---|---|
| Speed | 533 MHz | 533 MHz |
| RAM | 64 MB | 32 MB |
| Hard Disk | 5 GB | 5 GB |
| Monitor | 12.1" TFT | 12.1" CHPA |
| CD or DVD | 24 x CD | 24 x CD |
| Modem | 56 K | 56 K |
| Op System | WIN 98 | WIN 98 |
| Part N° | (A7886) | (B1870) |
| Rent 3 Yrs* | $24.00 | $21.47 |
| GST Inc | $2,448 | $1,959 |

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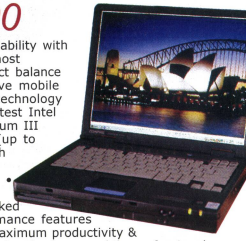
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JAN 8

## Compaq Armada E500

Delivers the ideal combination of performance and affordability with outstanding modularity & expandability solutions for utmost convenience. • This all-in-one portable delivers the perfect balance between expandability, integrated features and innovative mobile computing technology using the latest Intel Mobile Pentium III processors (up to 850MHz with SpeedStep technology). • The *Armada* E500 is packed with performance features to deliver maximum productivity & ease-of-use for the busy mobile professional.

| Processor | PIII | PIII |
|---|---|---|
| Speed | 700 Hz SS# | 700 MHz SS# |
| RAM | 64 MB | 64 MB |
| Hard Disk | 12 GB | 12 GB |
| Monitor | 15" TFT | 15" TFT |
| CD or DVD | DVD x | DVD x |
| Modem | 56 K | 56 K |
| Op System | WIN 95/98 | NT4 |
| Part N° | (A4116) | (A2399) |
| Rent 3 Yrs* | $57.96 | $59.51 |
| GST Inc | $6,359 | $6,529 |



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Finance methods are subject to approval.

IBM

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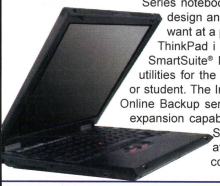
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# Notebooks, Desktops & Servers

## ThinkPad i Series

a better e-xperience

Providing a better e-xperience in portable computing, ThinkPad i Series notebooks offer the lightweight design and productivity features you want at a price you can afford. The ThinkPad i Series models offer SmartSuite® Millennium, plus helpful utilities for the hard-working entrepreneur or student. The Internet Scroll Bar, optional Online Backup service, multimedia and expansion capabilities make the ThinkPad i Series notebooks your affordable mobile computing solution



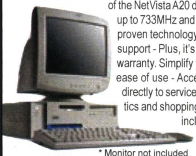
| Model | 116141M |
|---|---|
| Processor | C550MHz |
| RAM stand | 64MB |
| HDD | 5GB |
| Display | 12.1" TFT |
| PCMCIA support | 1 Type I |
| Fax/Modem | 56K V.90 |
| Op System | Windows ME |
| Rent TAP* | $25.98 |
| Part No | (B1090) |
| GST INC | **$2,649** |

Fly Buys.

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## NetVista A20

Meet your needs without compromising your budget - You can trust the proven technology of the NetVista A20 desktop, including a choice of Intel processors up to 733MHz and integrated graphics. Choose powerful, proven technology with world-renowned IBM service and support - Plus, it's backed by IBM, with a three-year, limited warranty. Simplify your computing experience with unparalleled ease of use - Access IBM allows you to click your way directly to service and support, system updates and diagnostics and shopping for options or upgrades. It's easy to expand, with three slots, four bays and five ports, including two plug-and-play USB ports. It's easy to service, too—with a new, easy-access mechanical design. Finally, NetVista A20 is easy to manage and secure, supporting IBM Universal Manageability tools and Client Security Solutions.



* Monitor not included

| Model | 6266E3A |
|---|---|
| Configuration | Sml Form Factor (3x3), PCI |
| Processor | C633MHz |
| RAM stand | 64MB |
| HDD | 10GB Ultra ATA |
| Monitor | not included |
| CD-ROM | 48x max |
| Op System | Windows 98 SE |
| Rent TAP* | $15.89 |
| Part No | (B3116) |
| GST INC | **$1,450RRP** |

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The figures quoted are based on a per week basis over 3 years. To approved persons, Terms and Conditions apply.

## eserver xSeries 200

| Model | 847842X |
|---|---|
| Level II Cache | 256KB/256KB |
| Processor | PIII 800MHz |
| RAM stand/max | 128/1500MB |
| HDD | 9.1GB |
| HDD type | Ultra 160 SCSI |
| Network interface | Ethernet Integrated |
| CD-ROM | 40x max- 20x min |
| Rent TAP* | $30.84 |
| Part No | (B1092) |
| GST INC | **$3,145** |

If your business is at the point where you need a server, but don't have a big budget, the IBM e server is the affordable solution. Packed with power and scalability features that support file-and-print serving, workgroup productivity applications and shared Internet access, the IBM e server is the reliable network foundation you need.



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Acer

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# Desktops and Notebooks

All Aspires standard with
- 15" Monitor
- Speakers
- V.90 56k internal fax
- Microtower housing

**Aspire 17" Monitor upgrade $150** extra- ask when placing your order!

## Acer Aspire

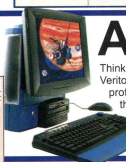
Aspire is what the home PCs all should be — so simple that it virtually sets itself up right out of the box. Powerful enough for the most demanding applications and graphics, and so friendly that it puts you in touch with the world of the Internet at the touch of a button.



| Model | Aspire 6300R | Aspire 6400 | Aspire 6400 | Aspire 6400 |
|---|---|---|---|---|
| CPU | Celeron 633 | Pentium III 800 | Pentium III 866 | Pentium III 933 |
| RAM | 64MB | 64MB | 128MB | 128MB |
| HDD | 10GB | 20GB | 30GB | 40GB |
| CD/LAN | 50x CD | 8x4x32 CD-RW | 8x4x32 CD-RW | 8x4x32 CD-RW |
| Video | Integrated UMA 8MB | TNT-2 32MB | TNT-2 32MB | TNT-2 32MB |
| Op. system | Win 98 | Win 98 | Win 98 | Win 98 |
| Part number | (B2365) | (B2364) | (B3078) | (B3075) |
| **RENT*** | **$19.71** | **$24.42** | **$28.04** | **$32.84** |
| GST INC | **$1,799** | **$2,490** | **$2,860** | **$3,349** |

**All Aspires come with the following fantastic software:** • MS Windows 98SE • I.E.5.0 • World Book Multimedia Encyclopaedia • Kidznet • PC-Cillin antivirus • PC-Doctor • My Aspire Guide • Aspire Recovery CD • Hasbro Interactive Battleship## • Acer Computer Explorer## • Aspire webSIGHT* • Hasbro 3 game CD: Sorry!, Yahtzee, Smart Games Challenge II## • Acer Camera Software Suite#

* Not included with Aspire 6300R
## Not included with Aspire 6400



## Acer Veriton

Thinking outside the box is the key concept behind the Veriton range of computers. Specifically aimed at professionals seeking high-level peformance without the look and feel of the traditional PC, the Veriton series reveals a space-saving design that revolutionises the look of the traditional office work desk.

| Model | Veriton FP2 |
|---|---|
| CPU | PIII 800MHz |
| RAM/HDD | 128/20GB |
| CD/LAN | 24xCD/LAN/FAX |
| Video | Intel Direct AGP |
| Monitor | 15" TFT LCD |
| Multimedia | 32-bit sound/speakers |
| Op System | Windows ME |
| Part number | (B1669) |
| **RENT*** | **$43.91** |
| GST INC | **$4,699** |

RentSmart

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The figures quoted are based on a per week basis over 3 years. To approved persons. Terms and Conditions apply.

## Acer TravelMate Notebooks

The TravelMate 350 offers unique integrated Smart Card technology to enable users to conduct secure online transactions, including online banking and shopping. The Smart Card also enables users to lock their systems against unauthorised access and supports encryption and decryption of files stored in the system.



| Model | 200DX | 201TXV | 350TE | 521iT | 602TER |
|---|---|---|---|---|---|
| Monitor | 12.1" HPA | 14.1" TFT | 13.3" TFT | 12.1" TFT | 13.3" TFT |
| CPU | C550 | C600 | PIII650SpeedStep | C600 | PIII650SpeedStep |
| RAM | 32MB | 64MB | 64MB | 64MB | 64MB |
| HDD | 5GB | 10GB | 10GB | 5GB | 12GB |
| Graphics | 4MB | 4MB | 8MB | 8MB | 8MB |
| CD-ROM | 24xCD | NO | NO | 24xCD | 20x4x4 CD-RW |
| DVD | NO | 6xDVD | 24xCD | NO | NO |
| Fax/Modem | 56Kbps | 56Kbps | 56Kbps | 56Kbps | 56Kbps |
| Other | NO | NO | 10/100 LAN | 10/100 Lan | 10/100 Lan |
| OS | Win Me | Win ME | Win ME | Win 98 | Win 98 |
| Part | (A9137) | (A9596) | (B3080) | (B1708) | (A2426) |
| **RENT*** | **$25.49** | **$37.33** | **$48.30** | **$30.38** | **$52.50** |
| GST Inc | **$2,599** | **$3,995** | **$5,299** | **$3,098** | **$5,760** |

Intel Inside Pentium III

**Pentium III available in some Acer Systems**

JAN 10

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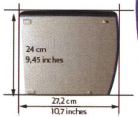
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# HP Desktops

NEW!! e-pc NEW!!




**Ultra-small, ultra-smart**
The revolutionary e-Vectra measures only 9.5 inches (24 cm) high.



**Storage**
Removable, generously proportioned hard disk drive for all user needs.





**Connectivity**
Lockable USB, serial, parallel, PS/2 and LAN ports to fit your computing environment.



**Media Choice**
Fast, slim CD and media-free models.



**Power**
Powerful Intel Pentium III and Celeron processor configurations and generous RAM to suit any business application.




**Operating Systems**
Choose from a range of Microsoft operating systems including Windows 2000 to match your corporate standard.




**e-Diagnostics**
The intelligent eDiagTools technology allows instant problem identification and web-enabled notification to HP or your support staff.

| Processor: | hp e-pc C633 | hp e-pc C700 | hp e-pc P800 | hp e-pc P866 |
|---|---|---|---|---|
| SDRAM | 64MB | 64MB | 128MB | 128MB |
| Hard Disk | 10G | 10G | 20G | 20G |
| FDD | optional | optional | optional | optional |
| Monitor | no | no | no | no |
| CD - ROM | 24x | 24x | 24x | 24x |
| OS | Windows '98 | Windows '98 | Windows '98 | Windows '98 |
| Modem | Yes | Yes | Yes | Yes |
| Software | Word 2000 | Word 2000 | Word 2000 | Word 2000 |
| Part No.: | (B1743) | (B1744) | (B1745) | (B1746) |
| GST INC: | **$1,958** | **$2,098** | **$2,459** | **$2,697** |
| **Rental:** | **$21.46** | **$22.99** | **$24.11** | **$26.45** |

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Accredited Workgroup Reseller HEWLETT PACKARD

Rent Smart

SEE PAGE 20 FOR MORE INFORMATION

*The figures quoted are based on a per week basis over 3 years. To approved persons, Terms and Conditions apply.*

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Delivery Australia-Wide

# HP Networks & Servers

## HP ProCurve Switch 408



Unmanaged 8 port 10/100 switch in a compact sized package. This switch offers half/full duplex, 10/100 autosensing on every port. Warranty: Lifetime, Exchange Next Day (79125) GST INC:

**$347**

## HP ProCurve Switch 2512 & 2524



NEW PRODUCTS!

- Lowest Price 10/100 Managed Switch
- Provides a rich, layer 2 feature set
- Includes 2 built-in gigabit transceiver slots
- Auto MDI/-X on all 10/100 and 100/1000 ports
- Lifetime warranty for as long as you own the product
- Wire-speed performance on all ports
- FREE HP TopTools Management Software included

**HP ProCurve Switch 2512** (12 port managed switch) (A9703) GST Inc:

**$1,540**

**HP ProCurve Switch 2524** (24 port managed switch) (B0062) GST Inc:

**$1,945**

## HP ProCurve Switch 2312 & 232



Ideal for low-cost, unmanaged 10/100 connectivity

NEW!!!

- Lowest Price 10/100 Switch
- Includes 2 Built-in Gigabit transceiver slots
- Brings 10/100/1000 solutions to the market
- Media-flexible ports for uplinks and server connections
- HP quality, functionality and performance
- Plug and play solution

**HP ProCurve Switch 2312** (12 port unmanaged switch) (B0063) GST Inc:

**$915**

**HP ProCurve Switch 232** (24 port unmanaged switc (B0064) GST Inc:

**$1,327**

## HP ProCurve Switch Modules

- HP ProCurve Switch Gigabit Stacking Kit (78306) GST INC: **$365**
- HP ProCurve Gigabit-SX Transceiver (82140) GST INC: **$1,098**
- HP ProCurve Gigabit-LX Transceiver (82141) GST INC: **$1,760**
- HP ProCurve100/1000-T Transceiver (A9127) GST INC: **$763**
- HP ProCurve 100-FX SC Transceiver (A9128) GST INC: **$624**

NEW!!!

## HP ProCurve Switch 4000m



HP's 40 port managed 10/100/Gigabit switch provides scalable low cost switching solution for organisations lookir for scalable, expandable, low-cost migration to 10/100/Gigab

- High speed/media-flexible uplinks including 10/100Bas T,Gigabit-SX, LX, and 1000Base-T.
- Switch meshing = high availability with high performan
- Stacking capability with single IP address management

(66063) GST INC: **$3,600**

***NEXT BUSINESS DAY ADVANCE REPLACEMENT - LIFETIME WARRANTY***

****PLEASE NOTE THAT PRICES ARE SUBJECT TO CHANGE ON ALL PRODUCTS****



HARRIS TECHNOLOGY. for all your computer needs!

All systems include: 7 mass storage shelves (4 available after floppy, CD-ROM & 9GB disc), 5 expansion slots (4 PCI, 1 ISA combination), integrated 10/100 network interface, and easy set up CD.



# NETSERVER E-200

The Server with the best price/performance value for small businesses

Starts your small business off on the right Track. The HP NetServer E200 offers the best value-to-performance ratio of any major server supplier.

A desktop PC may do the job when you are starting out, but as your small business expands, it quickly out grows the ability to cut corners on something as fundamental as a server. And with the HP NetServer E200 HP leads the top tier server suppliers offering full server grade technology, functionality and performance for the price of a PC.

- Intel PIII800 MHz processor with 133MHz front size bus
- 64MB registered ECC RAM standard (expandable to 768)
- 9.1GB, 7200rpm, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
- Integrated HP NetServer 10/100TX LAN adapter

Rent 3 yrs - **$31.77***

(B1564) GST INC: **$3,240**

Call for long term *rental pricing

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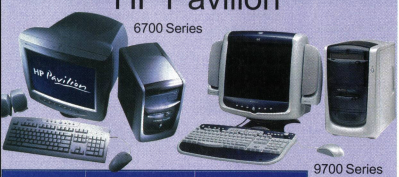
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# Complete home solutions

## HP Pavilion

6700 Series

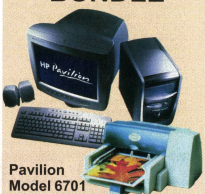


9700 Series

| Model | 6751 | 9734 |
|---|---|---|
| CPU | Intel® PIII 800MHz | Intel® PIII933MHz |
| Memory | 64MB SDRAM | 128MB SDRAM |
| HDD | 15GB | 30GB |
| CD-ROM | CDR-W Plus | CDR-W Plus |
| Modem | V.90 56Kbps | V.90 56Kbps |
| Op. system | Windows® Me | Windows® Me |
| Part number | (A9067) 15" Monitor | (B1505) 15" Monitor |
| GST INC | **$2,599** | **$3,499**RRP |
| Part number | (A9068) 17" Monitor | (B2587) 17" Monitor |
| GST INC | **$2,799** | **$3,699**RRP |

outstanding levels of performance

## hp PAVILION & hp PRINTER BUNDLE



**Pavilion Model 6701**

Celeron™ 633MHz, 64MB SDRAM, 15GB, 48x Max CD, V.90 56Kbps Modem, Windows® Me, 15" Monitor

**HP DeskJet 640C**

- Black and colour cartridges included - everything you need!
- Prints up to 6 ppm black and 3 ppm colour

Part number (B3088)

GST INC **$1,999**RRP

**$50 CASH BACK***

* $50 cash back redemption form from HP

**HP CD-RW 24xCD 4xCDR 4xCDRW** (96001) GST INC **$428**

**HP CD-RW 32xCD 8xCDR 4xCDRW** (99726) GST INC **$356**



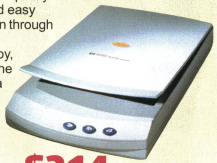

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# HP ScanJets

## HP ScanJet 4200C

Highest productivity for business

- 1200dpi optical, 9600dpi enhanced
- HP's Intelligent Scanning Technology provides fast photo- quality results
- Quick and easy installation through USB
- Scan, copy, email at the touch of a button

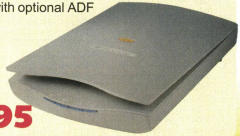


74117) GST INC **$214**

## HP ScanJet 5300C

One-step access makes it easy to scan, copy, e-mail, or fax your images

- Ideal for: Office managers wanting versatility and expandability & first-time scanner users
- Optical resolution 1200 dpi, enhanced resolution 9600 dpi, bit depth 36-bit
- Maximum document size 8.5 x 11.7 in, 8.5 x 14 in with optional ADF



(93770) GST INC **$495**

**HP Papers**

Premium Plus Photo Paper Glossy A4, 20 sheets (84904) **$29**

HP Premium Photo Paper A4, 15 sheets (54010) **$16**

HP Premium Photo Paper A3, 20 Sheets (58635) **$62**

JAN 13

# COMPUCON

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## Enjoy a world of difference



*Fast Delivery Australia Wide*

**COMPUCON 15.1" LCD Flat Screen Monitor** (A8436) GST Inc **$1,640**



### 667MHz Atlantis PC

COMPUCON

- Intel Celeron 667Mhz with 128K Cache
- Socket FC-PGA Motherboard, VIA 694, 133Mhz FSB
- 2 x Serial, Parallel, PS/2 keyboard and mouse, 2 x USB Ports
- 64MB PC133 SDRAM
- 10.2GB Ultra 66 IDE Hard Drive
- 4MB AGP Graphics Card
- Compucon Super Mid-Tower Case
- 1.44MB Floppy Drive
- Compucon Windows 95 PS/2 Keyboard
- Compucon PS2 Scroll Mouse
- Integrated Sound Blaster/ Direct Sound AC97 Audio
- 10MB Combo Network Card
- Windows 98 or 95 on CD
- 3 Years On-Site Warranty
- 5 PCI, 1 ISA, 1 AMR and 1 AGP 4X slots, 3 DIMMs

Rent 3 Yrs** **$16.66** (B2464) GST Inc

**$1,520***

*Monitor Not included



This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **$20.16** GST Inc:
**$1,840**
Monitor price is (25874)
GST Inc **$320**

### 650MHz Duron AMD PC

COMPUCON

- AMD Duron Socket A 650Mhz Processor with 192K cache total
- Socket A, VIA-KT133 Chipset 133Mhz mATX Motherboard
- 2 x Serial, Parallel, PS/2 keyboard and mouse, 2 x USB Ports
- 64MB PC133 SDRAM
- 10.2GB Hard Drive
- 4MB AGP graphics card
- Compucon Grey Mid-Tower Case
- 1.44MB Floppy Drive
- Compucon Windows 95 PS/2 Keyboard
- Compucon PS2 Scroll Mouse
- Integrated Sound Blaster/ Direct Sound AC97 Audio
- 10MB Combo Network Card
- Windows 98 or 95 on CD
- 3 Years On-Site Warranty
- 3 PCI, 1 CNR, 1 AGP slot, 2 DIMMs

Rent 3 Yrs** **$15.72** (B2463) GST Inc

**$1,435***

*Monitor Not included



This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **$19.23** GST Inc:
**$1,755**
Monitor price is (25874)
GST Inc **$320**

### Pentium 4 Centaur

COMPUCON

- Intel Penium 4 / 1.4Ghz CPU
- Intel D850GB Motherboard, i850 chipset
- 128MB RDRAM (Rambus)
- 30GB Hard Drive, 7200RPM
- Compucon Centaur Tower Case
- 1.44 MB Floppy Drive
- Compucon Internet Keyboard
- Compucon Scroll Mouse
- Leadtek S3251V 32MB SDRAM Video Card with TV out
- SoundBlaster 128 Sound Card
- Intel 10/100 Network Card
- Windows ME on CD, Microsoft Encarta
- Microsoft Games Pack
- 3 Years On-Site Warranty

Rent 3 Yrs** **$48.99** (B2473) GST Inc

**$5,375***

*Monitor Not included



This system with 17" Compucon Multimedia Monitor:
Rent 3 Yrs** **$52.91** GST Inc:
**$5,805**
Monitor price is (25906)
GST Inc **$430**

RentSmart

SEE PAGE 20 FOR MORE INFORMATION

The figures quoted are based on a per week basis over 3 years. To approved persons. Terms and Conditions apply.

### 667MHz Isis MiniStation

COMPUCON

- Intel Celeron 667Mhz CPU with 128K Cache
- Intel 810e Chipset Motherboard, 133Mhz FSB
- 64MB PC133 SDRAM
- 10.2GB Ultra IDE 66 Hard Drive
- 1 x Serial, Parallel, PS/2 keyboard and mouse, 2 x USB Ports
- GMCH Video with 4Mb SDRAM display cache
- Compucon Slim-line LPX Case with 90W PS
- (Dimensions of 78mm x 300mm x 320mm)
- 1.44MB Floppy Drive
- Compucon Windows 95 PS/2 Keyboard
- Compucon PS/2 Scroll Mouse
- Intel 10/100 Network Card + Wake-On-Lan
- Integrated in ICH Software audio
- Windows 95 or 98 on CD
- 3 Years On-Site Warranty
- (2 PCI, 1 AMR, 1 PTI-on riser, 2 DIMM slots)

Rent 3 Yrs** **$17.42** (B3090) GST Inc

**$1,590***

*Monitor not included



This system with 15.1" LCD Flat Screen Monitor:
Rent 3 Yrs** **$31.67** GST Inc:
**$3,230**
Monitor price is (A8436)
GST Inc **$1,640**

JAN 14

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# Quantum

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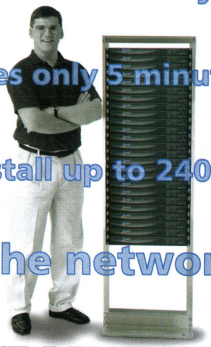
"If someone tells you

t takes only 5 minutes

to install up to 240GB

on the network,

DON'T BELIEVE IT."



**Ease of Use**
- Auto-sensing 10Base-T/100Base-TX
- Automatic recognition of network types/clients
- Supports DHCP, BOOTP and RARP
- Configuration via Web browser

**Features**
- Embedded OS (unlimited user license)
- Pentium-class processor
- Ultra ATA hard drives
- RAID 5, 1 or 0
- Easily supports 100 or more clients

**Compatibility**
- Simulaneous support for Windows 2000, NT, NetWare, UNIX, Linux and Macintosh networks and clients across TCP/IP, IPX, NetBEUI and AppleTalk networks

**Network Backup**
- Compatible with Windows and Netware backup software, including Veritas Backup Exec, Computer Associates ARCserveIT and Microsoft backup software for Windows 95/98/NT/2000

**Network Security**
- Integrates with Microsoft Domain Controllers or local user list

**Guarantee**
- 3-year parts and labour

**Price**

| | | | |
|---|---|---|---|
| 15GB | - (A3489) | GST Inc. | **$1,249** |
| 30GB | - (A3528) | GST Inc. | **$1,895** |
| 60GB | - (A8926) | GST Inc. | **$3,675** |
| 120GB | - (A8118) | GST Inc. | **$6,317** |
| 240GB | - (A8119) | GST Inc. | **$9,980** |

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**"I did it in 43.55 seconds."**

**Don Knisley, Network Engineer, US Air Force**

nap Servers are engineered for one purpose: file sharing. hat's why Don could have a Snap Server 2000 up and unning on a LAN in 43 seconds! "If I had the choice of nstalling an NT server for network storage or a Snap Server, d pick the Snap Server" says Don. "It's fast, easy and the rowser configuration tool is very intuitive." According to a ecent PC data report, 4 out of 5 workgroup network attached torage (NAS) servers sold are Snap Servers. That's why nap Server is the world wide leader and most awarded NAS roduct on the market today.



1. Plug into AC power 2. Connect to Ethernet hub 3. Turn Snap Server on




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# Quantum

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SONY

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# The World's largest Manufacturer of Data Media & Storage Products

**Assorted Memory Sticks**

**8MB Memory Stick** (88647) GST INC **$66**

**16MB Memory Stick** (86779) GST INC **$79**

**32MB Memory Stick** (88654) GST INC **$129**

**64MB Memory Stick** (88648) GST INC **$240**

ALL SONY DDS & AIT TAPE DRIVE KITS INCLUDE BONUS INNOCULAN ANTI-VIRUS SOFTWARE!

## CD Writer Kit CRX140EBK

IDE: 8x write, 4x rewrite & 32x read; Suites 5.25" 1/2 Height slot. Supplied with additional interface cable, audio cable, software (Adaptec Easy CD Creator & Direct CD for Win 95, 98, NT & 2000 Pro), media (one CD-R & one CD-RW disk), mounting screws & easy-to-follow installation manual.

INCLUDES BONUS DISCOUNT COUPON FOR RETROSPECT BACKUP




IDE: (88568) GST INC **$379**

## CD Writer Kit CRX160EBK

IDE: 12x write, 8x rewrite & 32x read; Suites 5.25" 1/2 Height slot. Shipped with additional interface & audio cable, Adaptec Easy CD Creator V4 CD mastering & Direct CD V3 copy software for Win 95/98, NT & 2000 Pro, one CD-R disk, one preformatted CD-RW disk and one HS-RW Disk, mounting screws & installation manual.

SUPPORTS NEW HIGH SPEED RE-WRITING MODE




IDE: (A7054) GST INC **$530**

SCSI: (A7056) GST INC **$615**

STORAGE

## FLAT DISPLAY LCD

### SDMN50 (15")

15" XGA TFT Active Matrix LCD Panel, Black Matte Finish, Bright Picture, Sharp Images - 300:1 Contrast Ratio 200 cd/m2 Luminance / 0.297mm Dot Pitch, 1024 x 768 @ 75Hz, Wide Viewing Angle 140°, Stereo Speakers in Base, On-screen Digital Controls, Windows® 95/98 and Windows® NT.



(97422) GST INC **$2,679**

### SDMM51 (15.1")

15.1" XGA TFT Active Matrix LCD Panel • Digital Multiscan® supports up to 1024 x 768 @ 75 Hz, Max resolution 1024 x 768 @ 75Hz. Wide viewing angle - 140°, Built-in Stereo Speakers and Headphone Jack, Windows® 95/98 and Windows® NT.



(B0916) GST INC **$2,068**

### CPDL181 (18.1")

18.1" SXGA TFT Active Matrix LCD Panel, Lightweight at 9 kg, 206mm deep, 300:1 contrast ratio, 200cd/m2 luminance, 0.2805mm dot pitch, Res 640 x 480 up to 1280 x 1024 @ 85Hz, Wide Viewing Angle - 140° horiz & 110° vert, Low Power Consumption, Windows NT And Windows 98.



(84011) GST INC **$5,430**

MONITORS

## Cyber-shot DSC-S30

Memory Stick

**Memory Stick Digital Camera**
**1.3 Megapixel**

InfoLithium M (NPFM50), 3x Zoom (6x Precision Digital), 2.5" Free-Angle LCD, Email, Video out, USB, External flash socket, 1280x960 (1.3 Megapixel) Resolution, MGI PhotoSuite (Windows/Mac), MGI VideoWave



(99849) GST INC **$1,050**

## Cyber-shot DSC-F505V

Memory Stick

**Memory Stick Digital Camera**
**3.3 Megapixel**

InfoLithium S (NPFS11), 5x Zoom (10x Precision Digital), 2" LCD, MPEG Movie HQ, Voice Memo, Email, Audio/Video out, USB, External flash socket, 2240x1680 (3.3 Megapixel) Resolution, MGI PhotoSuite (Windows/Mac), MGI VideoWave



(A7100) GST INC **$1,623**

## Mavica FD85

**Floppy Disk Digital Still Camera**
**1.3 Megapixel**

3.5" 2HD Floppy, InfoLithium L (NPF330/NPF550), 3xZoom (6x digital), 2.5" LCD, MPEG Movie, Voice Memo, Email, Audio/Video Out, External Flash Socket, 1280x960 (1.3 Megapixel) Resolution, Memory Stick/ Floppy Disk Adaptor Compatible, MGI PhotoSuite, MGI Video Wave




(A0814) GST INC **$1,298**

## Mavica CD1000

**Mini CD-R Digital Still Camera**
**2.1 Megapixel**

8cm 156MB CD-R, InfoLithium L (NPF330/ NPF550), 10x zoom (20x Precision Digital), Electronic Viewfinder, 2.5" LCD, MPEG Movie HP, Voice Memo, Email, Audio/ Video Out, USB, External Flash Socket, 1600x1200 (2.1 Megapixel) Resolution, Picture Gear 4.1 Lite, MGI PhotoSuite, MGI VideoWave, Adaptec DirectCD.



(A7097) GST INC **$2,455**

CAMERAS

JAN 16

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SONY

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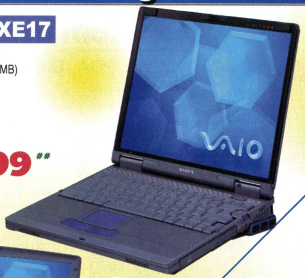
# Works Hard, Travels Light

## Sony VAIO XE17

- Intel Pentium III, 800MHz
- 128MB SDRAM (Max 256MB)
- 20GB HDD
- 14.1" colour TFT display
- Jog-Dial, USB & i-link™
- Docking Station

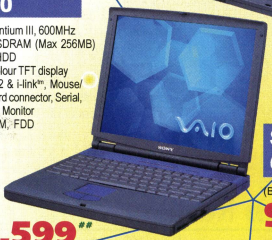
(B2173) GST INC

**$6,199**##



## Sony VAIO F670

Intel Pentium III, 600MHz
64MB SDRAM (Max 256MB)
12GB HDD
14.1" colour TFT display
USB x 2 & i-link™, Mouse/ Keyboard connector, Serial, Parallel, Monitor
CD-ROM, FDD



(B2174)
GST INC
**$3,599**##

## Sony VAIO C1VM

- Crusoe(tm) Processor
- TM 5600 600MHz
- 128MB SDRAM (Max 192MB)
- 12GB HDD
- 8.9" colour TFT display
- USB & i-link™, Memory Stick slot
- Camera 1/6", 350,000 pixel progressive scan CCD.

(B2176) GST INC

**$3,799**##



## Sony VAIO SR9G

Intel Pentium III, 600MHz
64MB SDRAM (Max 256MB)
12GB HDD
10.4" colour TFT display
USB, i-link™,
Memory Stick slot

(B2499) GST INC

**$3,499**



## Sony VAIO Z505GA

- Intel Pentium III, 750MHz
- 128MB SDRAM (Max 256MB)
- 20GB HDD
- 12.1" colour TFT display
- USB x 2, i-link™, 10/100 Network Connector, Memory Stick Slot

(B2175) GST INC

**$4,899**##



VAIO


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# Mobile Access Solutions

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## Xircom Rex 5000 Companion

### Micro PDA, BIG in functionality.

ACTUAL SIZE!!




Access information on the run with Xircom REX 5000. The REX is a credit card-sized wearable information accessory that keeps you connected to the information you need anytime, anywhere.

- PCMCIA: Type II PC Card
- Enter, store, synchronize crucial data including contacts, schedules, task lists, memos, web content and more.
- Credit card-sized, light weight portability - Size - 3/8 x 21/8" x 1/4"
- Instantly synchronize data with your PC using trueSync software - including software applications such as ACT, Organiser, Outlook, Sidekick and Schedule+
- Powerful - access up to 6000 Entries
- On the go data entry with 9-line Display
- Synchronize web content to you REX

(86631) GST Inc: **$169**

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## Xircom RealPort 2

### The only access cards with integrated connectors! No more hassles with fragile cables & pop-out jacks.

The Only Personalized Notebook Communications Solutions: The RealPort2 Integrated PC Card with Built-in Connectors and Mix and Match Flexibility. RealPort2 Integrated PC Cards with built-in connectors add flexibility by enabling users to choose from a wide variety of access cards that can be used alone or mixed and matched to meet communications requirements now and in the future. Combine a 56K modem, 10/100 Ethernet LAN, wireless data access via your mobile phone, ISDN and more!

**5 Easy steps as follows**



1. Choose Desired Realport2 Cards
2. Flip one RealPort2 card over and place on top of the other
3. Align tabs and join cards
4. Insert joined cards into PC Card slot of Notebook
5. Plug in cables

**Realport2 Global Access Modem**
(92739) GST Inc: **$389**

**Realport2 10/100 Ethernet Card 16 bit**
(92746) GST Inc: **$282**

**Realport2 CardBus 10/100 Ethernet 32 bit**
(92756) GST Inc: **$315**

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# Power Back Up = Power Protection

## APC Smart-UPS 2U Rack Mounts® FOR SMALL OFFICE SERVERS

### Smart-UPS 700, 1000, and 1400 2U Rack Mounts

etwork power protection to increase availability of your system. APC Smart-UPS 2U Rackmount features include nger runtime to keep your system safe and a 2U design to save your valuable rack space by 30%. Hot swapping atteries is also now faster and easier with the replacement battery chassis tray.



APC Smart-UPS **2u700**
(99595) GST INC **$790**

APC Smart-UPS **2u1000**
(99596) GST INC **$1,149**

APC Smart-UPS **2u1400**
(99597) GST INC **$1,599**

## APC BACK UPS PRO® FOR WORKSTATIONS

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PowerChute® Plus software lets your UPS shut down your pplications gracefully in the event of an extended power failure

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APC Back-UPS Pro **280si**
(76636) GST INC **$249**

APC Back-UPS Pro **420si**
(76637) GST INC **$292**

APC Back-UPS Pro **650si**
(76638) GST INC **$529**

## APC Surge Arrest PNote Pro®

n APC SurgeArrest is your guarantee that your ardware and valuable electronics are protected egardless of lightning strikes and everyday nexpected power surges. SurgeArrest also offers e best protection from line noise which can cause itches and errors in electronic operations and mputer data.

The SurgeArrest Notebook Pro Surge Protector provides the mobile notebook professional with advanced AC and telephone line protection. The unique, in-line design creates a compact, lightweight surge protector that is truly portable and appropriate for use in any country throughout the world. With built-in Excess Current Detection, the Notebook Pro warns you against potential modem damage. A Velcro mounting strap and 6 ft. telephone cord eliminate the need to carry any additional accessories.



**SurgeArrest 5 Strip**
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**PNote Pro**
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**$62**



**Back-Ups for PC's!**

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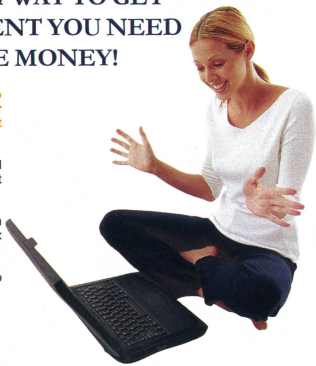
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Now you can shop online with Harris and be approved for up to $15,000 in RentSmart finance in just minutes.

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Remember, renting is the cost-effective solution for businesses to get the technology they need to succeed.

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| $3000 | $29.42 | $39.12 |
| $5000 | $45.58 | $62.08 |

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### *Total Access Security for Networks & E-Commerce*
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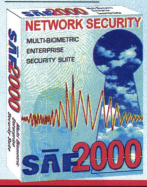
**SAFtyLatch**




Folder Protection for Individual PC's Using Voice Technology

(A5456) GST Inc: **$135**

**SAF2000**




Multiple Biometrics Suite For Enterprise Networks

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**Veridicom**

Capacitance Finger Image Scanner

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**Phoenix**

Programmable keyboards for Security, Banking and Point of Sale



(A5453) GST Inc: **$450**

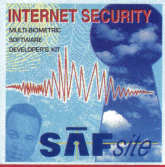
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**SAFsite Server with 10 Users**



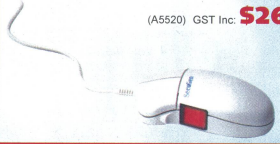

Development Tools for All On-Line Security Solutions

(A5511) GST Inc: **$345**

**SecuGen**

Optical Finger Image Scanner

(A5520) GST Inc: **$265**



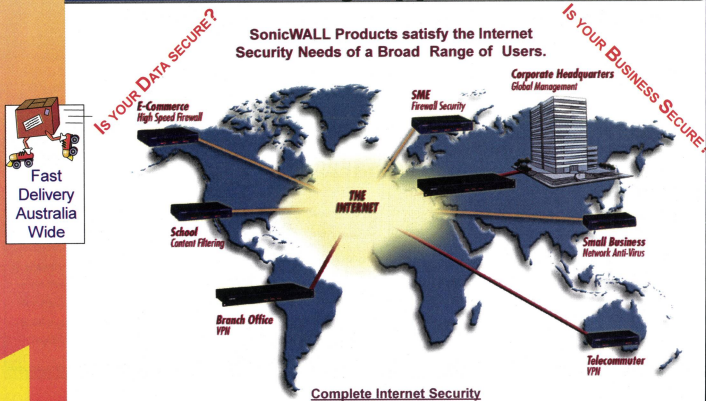
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# Internet Security Appliances




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## Complete Internet Security

**Firewall Security.** SonicWall Internet security appliances use stateful packet inspection to protect the private LAN from hackers & vandals on the Internet

**IPSec VPN.** SonicWall VPN provides an easy, affordable & safe way to connect offices & partners together over the Internet. Encryption methods include 168 bit Data Encryption Standard, (Triple-DES), 56 bit Data Encryption

**Standard (DES) & 56 bit ARCFour.** SonicWall VPN can be used with IPSec VPN products such as Checkpoint Firewall-1, Cisco PIX, Nortel Contivity & Axent Raptor. With the SonicWALL Authentication Service, you can add strong Authentication via public key infrastructure, (PKI) and digital certificates.

**ISCA certified.** SonicWall has been awarded the internation ally accepted ISCA certification. Network Anti-Virus. Based o Network Associates' product, the SonicWall Anti-Virus ensures corporations are protected against the latest virus outbreaks by automatically updating the clients as soon as new cures are available.

**Internet Content Filtering.** Businesses can create & enforce Internet access polices tailored to their needs.

**AutoUpdate.** All firmware updates are free for the life of the product. The firewall automatically checks for new firmware updates with protection against newly discovered hacker attacks.

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| Model | Details | Part No | INC GST |
|---|---|---|---|
| TELE2 | Max 5 users. Inc. Branch VPN Upgrade<br>* For securing telecommuters. Cable/xDSL users. small offices. | (B3030) | **$1,499** |
| SOHO2 | 10 users. 1 X WAN Interface. 10/100 Base-T auto-sensing.<br>1 X LAN Interface 10/100 Base-T auto-sensing.<br>10 x VPN tunnels. 3/DES | (B3031) | **$1,250** |
| SOHO2 | 50 users. 1 X WAN Interface. 10/100 Base-T auto-sensing.<br>1 X LAN Interface 10/100 Base-T auto-sensing. 10 x VPN tunnels.<br>3/DES * Upgrade to support 50 or unlimited users (nodes).<br>* For securing SOHO sites or for linking up to 10 sites via VPN. | (B3034) | **$2,498** |
| XPRS2 | Unlimited users. 1 X WAN. 1 X LAN. 1 X DMZ Base-T. auto-sensing.<br>Toshiba TX3927 CPU. 3/DES. optional Branch VPN upgrade.<br>Supports multiple Remote User VPN tunnels. 20 x VPN tunnels<br>* For hosting more active or multiple public servers & RU-VPN | (B3038) | **$5,545** |
| PRO | Unlimited users. 1 X WAN. 1 X LAN. 1 X DMZ Base-T. auto-sensing.<br>Rack mountable. 233 HMz StrongARM RISC CPU. Upgradeable memory.<br>Inc Branch VPN Upgrade Supports multiple Remote User VPN tunnels.<br>* For securing large sites, hosting public servers, & RU-VPN | (B3039) | **$7,389** |
| PRO-VX | Same features as the PRO plus more..... Adds VPN Acceleration card.<br>RAM/Flash - 16MB/4MB RAM & inc. 50 x VPN clients.<br>*For supporting up to 1,000 Branch & Remote VPN tunnels. | (B3040) | **$11,998** |

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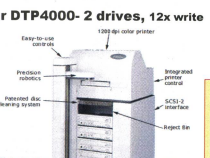
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# Printer, Camera's & CD-R/W

## Desktop CD Duplicator
## CEDAR DTP

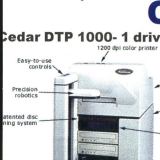
**Meet your New Office Partner**

**Cedar DTP4000- 2 drives, 12x write**




(B2969) GST INC **$17,814**

**Cedar DTP 1000- 1 drive**




(B2968) GST INC **$13,734**

The Cedar Desktop Publishers integrate software, production robotics and ink jet printing for quick, easy production of one-of-a-kind CDs or duplicate CDs

***Connects to your computer. Ready to go. Easy to do!***

For the ultimate in compact design, officer convenience and professional CD-R quality, choose CEDAR.

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## Network Cameras
## AXIS

**If a picture says a thousand words then an Axis network camera can speak volumes.**



Catch it, Web it, Watch it... Complete with built-in Web server and motion detection, the AXIS 2120 Network Camera is all you need to keep a visual track on events both at home, and at the office. And of course – it is the perfect tool for any web attraction application! With no PC required for transmitting your images over the WAN/LAN or the Internet - you're just a network plug away from live remote monitoring from any convenient desktop. It's Plug-and-Watch technology from Axis.

- Plug-and-Watch – over any TCP/IP network
- Built in Web Server
- Built in motion detection
- Linux Operating System
- Video stream – 25/30 images/second
- DC iris support– for outdoor light conditions



AXIS COMMUNICATIONS

(A3916) GST INC **$2,750**



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## Burnproof CD Rewriter
## PLEXTOR 12/10/32A




ATAPI CD - Recorder/Rewriter/Reader with BURN-Proof echnology. Recently voted First Class in BEST Great stuff – sted and approved in top-secret labs of Wired Magazine eptember 2000. While your friends spend up to half an hour r disc burning audio CDs at 2x or 4x, Plextor's CD-RW drive asts them out in 6 minutes. The PlexWriter 12/10/32A's name means that it records CD-R discs as 12X peed, rewrites CD-RWs at 10X, and reads back all CDs at 32 speed. Top-notch manuals and software make stallation easy. The drive's accuracy is perfect – no misses or skips. Plextor are the leaders in CD-RW. BURN Proof uffer Under RuN – Proof) enables you to stop writing before buffer under run errors occur and then to continue riting by tying last point of recording and the next start point.....no more drink coasters. Comes with software , ables, manuals, ready for installation.

(A4769) GST INC **$769**

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# NETGEAR™

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## Plug into the power of networking!

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### 10/100 FAST ETHERNET SWITCHES

The NETGEAR Fast Ethernet switches deliver high performance switching technology in a compact, affordable package. Auto-mode and duplex sensingthese are the perfect solution for segmenting smaller networks or connecting subnets for superior performance!

**FS 105** 5 Port 10/100 autosensing
(84722) GST Inc: **$189**

**FS 108** 8 Port 10/100 autosensing
(70905) GST Inc: **$295**

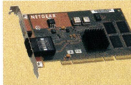
**FS 308** 8 Port 10/100 autosensing
(77242) GST Inc: **$465**

**FS 116** 16 Port 10/100 autosensing
(A5347) GST Inc: **$55**

**FS 516** 16 Port 10/100 autosensing with Interna PSU and Vista network ports
(60522) GST Inc: **$89**

**FS 524** 24 Port 10/100 autosensing with Internal PSU and Vista network ports
(77549) GST Inc: **$1,19**

HARRIS TECHNOLOGY for all your computer needs!



### GIGABIT (Fibre & Copper)

These high performance Gigabit switches provide either fibre or copper backbone connectivity for power workgroups, data centres and server famrs. No additional modules are required with each product ready to install straight from the box.

**GA 620T** 32/64 bit PCI gigabit Network card
(77291) GST Inc: **$740**

**GS 504T** 4 port 100/100 all over copper
(A1375) GST Inc: **$3,239**

**FS 510T** 2 port 100/1000 with 8 10/100 ports al over copper
(A1209) GST Inc: **$1,78**

**FS 518T** 2 port 100/1000 with 16 10/100 ports all over copper
(A1374) GST Inc: **$3,01**

Fibre gigabit switches also available, GA620, GS504, FS509 and FS518.

**Web Direct**
See Web Direct Link (at top of page) for more products and latest info!



### 10/100 DUAL SPEED HUBS

The NETGEAR dual speed hubs allow you to mix and a match 10 and 100 Mbps speeds on the same network, offering the maxium in flexibility.

**DS 104** 4 Port 10/100Mbps
(70795) GST Inc: **$165**

**DS 106** 6 Port 10/100Mbps
(84721) GST Inc: **$217**

**DS 108** 8 Port 10/100Mbps
(18755) GST Inc: **$245**

**DS 116** 16 Port 10/100Mbps
(81519) GST Inc: **$439**

**DS 508** 8 Port 10/100Mbps with internal PSU and vista network ports
(18738) GST Inc: **$439**

**DS 516** 16 Port 10/100Mps with internal PSU and vista network ports
(18747) GST Inc: **$590**

**DS 524** 24 Port 10/100Mbps with internal PSU and vista network ports
(69474) GST Inc: **$779**

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# NETGEAR™

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## Take the work out of networking!



### SHARED INTERNET ACCESS

The Netgear routers offer the ability to connect to the internet easily using ISDN, analogue or cable/DSL. All products support IP routing and offer NAT and DHCP for security and ease of set-up

**RT 314** 4 Port 10/100Mbps switch with cable/DSL interface
(A8862) GST Inc: **$446**
IN STOCK NOW

**RT 311** 1 Port 10/100Mbps switch with cable/DSL interface
(97719) GST Inc: **$419**

**RT 338** 1 port 10/100mbps ISDN router
(97718) GST Inc: **$689**

**RT 328** 1 port 10baseT ISDN router
(68900) GST Inc: **$610**

**RM 356** 4 port 10baseT hub with integrated 56k modem
(70197) GST Inc: **$570**



### PRINT SERVERS

The Netgear print servers enable you to connect your printer to a network for sharing amongst multiple PC's.

**PS 105** 4 Port 10baseT hub with BNC connection & 1 parallel printer port
(67225) GST Inc: **$229**

**PS 110** 1 Port 10/100 with 2 parallel printer ports
(67226) GST Inc: **$249**

**PS 113** 1 Port 10/100 with 3 parallel printer ports
(A3287) GST Inc: **$374**

**FREE 24HRS X 7 DAYS SUPPORT**



### NETWORK STARTER KITS

Everything you need to start networking right away.
Within a few minutes, you will be able to share files and printers, exchange emails, play interactive games and share access to the Internet.

**SB 105** 5 Port 10 Mbps hub, 2x10/100 PCI cards, cables, modem sharing software andguide
(A3293) GST Inc: **$129**

**FB 105** 5 Port 10/100 switch, 2x10/100 PCI Cards, cables, modem sharing software and guide
(A3935) GST Inc: **$249**



### 10MBPS ETHERNET HUBS

These hubs provide easy plug-and-play solutions to small businesses, home offices and low-density workgroups. BNC/AUI backbone support also available.

**EN 104TP** 4 Port Hub
(53456) GST Inc: **$69**

**EN 106TP** 6 Port Hub
(57629) GST Inc: **$89**

**EN 108TP** 8 Port Hub
(53458) GST Inc: **$99**

**EN 116** 16 Port Hub
(53459) GST Inc: **$215**

**EN 516** 16 Port Hub with internal power supply and vista network ports
(17425) GST Inc: **$259**

**EN 524** 24 Port Hub with internal power supply and vista network ports
(17435) GST Inc: **$315**

NETGEAR

**FA 311** Ethernet Adapter 10/100 PCI
(A1372) GST Inc: **$49**

**FA 312** Wake on Lan card
(A1373) GST Inc: **$53**

**FA 410** PCMCIA 10/100 Mbps Network Card
(60071) GST Inc: **$155**

**FA 510** Network Card for Notebook PC
(81319) GST Inc: **$160**

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# Worldwide Leader in Networking for the Internet

## Cisco 800 Series

The Cisco 800 series router provides enhanced network security and reliability through the power of Cisco IOS software tailore for small offices and telecommuters. It is recommended for small offices of up to 20 users, connecting every user to the Intern or to the corporate LAN with one ISDN line. NB - all software sold separately.



**Cisco 801** (78662) GST INC **$1,05**
1 Ethernet and 1 ISDN Basic Rate Interface (BRI).

**Cisco 803** (72566) GST INC **$1,56**
4 – port shared Ethernet hub, 2 analog POTS, & 1 ISDN BRI.

**Cisco 805** (80398) GST INC **$1,27**
Frame Relay, leased line, or async dial-up access to the Internet.

## Cisco 1600 Series

The Cisco 1600 is the proven choice for the flexible Internet / Intranet access for small branch offices and small businesses. addition to one fixed WAN port and one Ethernet port, the Cisco 1600 models support one WAN interface card, which allov customers to add or change WAN ports as needed. WAN options include ISDN, Frame Relay and X.25. NB - all software sc separately.



**Cisco 1601 – R** (79373) GST INC **$2,59**
One serial port with synchronous performance up to E1 speeds for Frame Relay and X.2 WAN services, or async performance up to 115.2 kbps. Higher speed than ISDN.

**Cisco 1603 – R** (A0132) GST INC **$2,59**
ISDN (BRI) and ISDN leased line connectivity.

## Cisco 1720 Series

The Cisco 1720 access router delivers a flexible, integrated solution for small / medium businesses and small branch offices that want to deploy secure Internet, Intranet, and Extranet access. The Cisco 1720 is a fully modular solution that provides the access router, optional high-speed encryption, a VPN tunnel server, IPSec, and a dynamic firewall. This solution enables you to minimize your setup costs and reduce the ongoing time and expense required to manage the network. NB - all software sold separately.



**Cisco 1720 -** (71554) GST INC **$2,08**
An integrated routing solution that delivers optimised security and flexibility in a desktop for factor for small / medium businesses or small branch offices interested in deploying Interne Intranet and Extranet access. Modular WAN slots to support future growth by providi upgradeable WAN services and higher densities of WAN connections. Features a performances to support new world services including VPN's and broadband technologie Support for encrypted WAN performances greater than 128kbps. Router configurations th require two ISDN BRI interfaces. An autosensing 10/100 Mbps Fast Ethernet LAN connecti to provide easy upgrade to Fast Ethernet.

## Cisco Catalyst 2900 Series XL

Cisco's Catalyst 2900 Series XL is a full line of stand alone, 10 /100 autosensing Fast Ethernet switches that combine outstandi performance, ease of use, and integrated Cisco IOS software.



**Catalyst 2912XL** (74277) GST INC **$1,89**
Switch for connecting smaller Ethernet Fast Ethernet workgroups or servers. Low ent price

**Catalyst 2924C XL** (78298) GST INC **$4,03**
Dedicated 10 – Mbps or 100 – Mbps connections to individual PC's, servers, and oth systems. High-speed uplink flexibility over extended distances with 100BaseFX connectio (Catalyst 2924C XL only).

## Cisco Aironet 340 Series

The Cisco Aironet 340 series of wireless LAN (WLAN) products provide a standards-based, high-speed wireless networki solution for both in-building and building-to-building WLAN applications.



Cisco Aironet products can be seamlessly integrated into wired Ethernet networks, providi excellent investment protection through full compliance with the IEEE 802.11b wireless standa These products utilise direct sequence spread spectrum (DSSS) technology to deliver up 11 Mbps throughput. Data security is ensured through 128-bit Wired Equivalent Privacy (WE that is comparable to traditional wired LANs.

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# Connectivity where & when you need it

## 3Com® OfficeConnect™ Dual 56K Lan Modem



OfficeConnect Dual 56K LAN Modem brings low-cost, high-speed Internet and Ethernet connectivity to your Small Office/Home Office computers in just minutes! This product is designed for non-technical users that need radical simplicity, high speed Internet access as well as local file and print sharing capability.

(A3358) GST Inc **$759**

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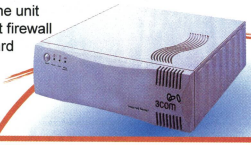
Ballarat (VIC), Camberwell (VIC) & Epping (VIC)

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Not all products are in-store, but consulting & advice available on all items

## 3Com® OfficeConnect™ Internet Server

3Com's OfficeConnect Internet Server is the most full-featured, reliable and easy-to-use network server appliance available. In one simple and powerful solution, the OfficeConnect Internet Server empowers small and mid-sized businesses with all the basic Internet management tools necessary to lower overall connectivity costs and improve employee productivity. The unit has built in email, web, file and print servers and a robust firewall to provide security from the outside world. An install wizard and client wizard ensure that the Internet Server is connected to the internet within 15 minutes.



(B2951) GST Inc **$3,300**

## 3Com® OfficeConnect™ E-Mail Server



The Office Connect Email Server is an affordable, easy to install and use, email solution for SB networks that want to dramatically improve their internal and external communications. The complete software/hardware solution can be installed and configured within minutes by a person with no IT expertise using a web-based administration interface and it enables all network users to send and receive email from their desktop.

(B2950) GST Inc **$1,480**

* Capable of receiving downloads at up to 56 Kbps and sending at up to 31.2 Kbps. Due to IC/FCC regulations on power output, receiving speeds are limited to 53 Kbps. Actual speeds may vary. Requires compatible analog phone line and server equipment. See www.3com.com/56k/ for details.

## 3Com® OfficeConnect™ Network Storage Server

The Office Connect Network Storage Server is an affordable, easy to install and use, file sharing solution for Small Business networks that want to dramatically improve their efficiency. The complete software/hardware solution can be installed and configured within minutes by a person with no IT expertise and it allows SB to easily add more shared storage space to their network and access shared files locally or remotely over the web.



(B2952) GST Inc **$1,415**

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## Small-Medium Business Networks

For all your small to medium business and home network needs please call for more information and pricing. We have an extensive range of fantastic D-Link products on our database.

### DKVM-8

**8 Port Keyboard, Video and Mouse Switch**

"Easy to use,powerful, and scaleable KVM solution" • Controls 8 different server PC's w/keyboard • Utilizers advanced microprocessor emulation, 2 sets of cables, user friendly interface.



NEW PRODUCT

(B2656) GST Inc: **$859**

### DES-1016R

**16 Port Switch for Workgroups**

Built with advanced functions, these switches are designed for the workgroups with advanced requirements. Powerful yet easy to use, they allow users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidth, boost response time and satisfy heavy load demand. Rack mountable.



(98255) GST Inc: **$795**

### DES-1008D

**8 Port Fast Ethernet Switch**

The D-Link DES-1008D is a powerful desktop Dual Speed 8-port 10/100Mb Ethernet/Fast Ethernet NWay auto negotiating Switch.



(98254) GST Inc: **$289**

### DI-701

**Cable ADSL Gateway**

The D-Link DI-701 Residential Gateway protects your computers from hackers or unwanted users. It is the easiest and safest way to share your high-speed Internet connection with a DSL Modem or Cable Modem.



(98249) GST Inc: **$379**

Web Direct

See Web Direct Link (at top of page) for more products and latest info!

### DWL-1000AP

**D-Link Air Access Point**

Fast 11 meg Performance. Build The Size of Your Wireless Network, or Extend Your Existing Wired Network.



NEW Wireless TECHNOLOGY

(A9251) GST Inc: **$995**

### DWL-650

**D-Link Air Wireless PCMCIA Network Card**

11 Megabit Performance. IEEE 802.11b. Make any note book truly portable within your office environment.



NEW Wireless TECHNOLOGY

(A9247) GST Inc: **$345**

## Other products available from D-Link

| Description | Part # | GST Inc |
|---|---|---|
| D-Link DP-303 10/100 Print Server (3xParallel Port) | (A8876) | $310 |
| D-Link DU-560M External V.90 56K Voice/Fax/Data Modem (USB) | (98306) | $105 |
| D-Link DFM-560I Internal PCI V.90 56K Voice/Fax/Data Modem | (74361) | $64 |
| D-Link DES-3225G 22+2 port 10/100Mbs Mang Switch W/ V-Lan | (90755) | $1,979 |
| D-Link DFE908DX 8 Port 10/100Mbs Dual Speed Hub | (60558) | $289 |
| D-Link DFE-916DX 16 Port 10/100Mbs Dual speed hub | (87207) | $539 |
| D-Link DFE2624x24-port 10/100Mbps Stackable Dual Speed Hub | (98307) | $1,149 |
| D-Link DP-602 2 Port Internet Network Server | (81535) | $379 |
| D-Link DFE-530TX PCI-Bus 10/100Base TX Fast Ethernet Adapter | (62956) | $42 |

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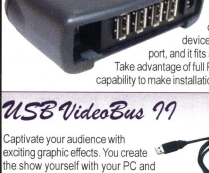
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# The Future of USB is Here...

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## USB Hub F5U101



(96865) GST Inc: **$85**

**A Belkin USB 4-port hub!** This compact modular hub allows you to connect 4 USB devices to a single USB port, and it fits almost anywhere. Take advantage of full Plug-and-Play capability to make installation a breeze.

## USB Direct Connect F5U104



With the Belkin Direct Connect you can play multiplayer games at speeds up to 150 times faster than a 56K modem. Now you're really cooking! Join computers without any networking hassle. Simply plug the Direct Connect in and the installation program does all the work for you. Just plug it in! Now you can play games, share files, drives, printers, and much more.

(96890) GST Inc: **$124**

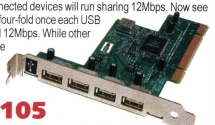
## USB VideoBus II F5U208



Captivate your audience with exciting graphic effects. You create the show yourself with your PC and camcorder merged into a desktop video studio by the Belkin USB VideoBus II. The Belkin USB VideoBus II, complete with MGI VideoWave III SE software, gives your PC the power to make stunning movies and more!

(xxxxx) GST Inc: **$147**

## USB QuadraBus F5U006-UNV



With the power of QuadraBus™ technology, the Belkin 4-Port PCI Card delivers 12Mbps of bandwidth to each of it's four USB ports. Consider how sluggish four connected devices will run sharing 12Mbps. Now see their performance rise four-fold once each USB device receives the full 12Mbps. While other 4-Port PCI cards divide bandwidth, the Belkin 4-port PCI Card multiplies it.

(B2940) GST Inc: **$105**

## Start the New Year off right!

### Firewire PCI Card F5U501



Capture your world in digital video! The IEEE 1394 PCI Host Adapter transforms the desktop PC into a DV-editing bay. With data transfer speeds up to 400Mbps, this IEEE 1394 (FireWire® or i.LINK® or IEEE 1394) innovation delivers lightning-quick video input & output. Its bus supports up to 63 hot-swappable devices!

(A7792) GST Inc: **$126**

### Mouse Pad F8E262



The WaveRest™ Gel Mouse Pad offers ergo support for your wrists with its patented Wave design. The gel cushion creates a Gel|Flex™ Comfort Zone that contours to your wrist's natural curves.

(97245) GST Inc: **$16**

### AeroCruiser Mouse F8E888



Finally...an innovative, aerodynamically designed mouse that empowers the user with the ability to customize the color accent according to their own individualism. Belkin Components has created a truly revolutionary design and combined it with solid engineering

(B2941) GST Inc: **$42**

## Don't Forget...

### USB Cable F3U133



A Belkin Pro Series USB device cable will keep those dream machines error free. Features high performance 20-gauge power wires that allow you to maximize the full potential of USB.

**USB Device Cable,**
A-B, 1.8m - (96893) GST Inc: **$12**
A-B, Gold 1.8m - (96875) GST Inc: **$17**

**USB Extension Cable,**
Male-Female, 1.8m - (96895) GST Inc: **$14**
Male-Female, Gold 1.8m - (96876) GST Inc: **$18**

Also available in colors: blue, grape, lime, tangerine, & strawberry

### Printer Cable F2A046



This Pro Series Parallel Printer Cable links your IEEE 1284 printer with a Centronics 36-port to your PC with a DB25 port. Featuring our exclusive wiring design & cable technology that guarantees optimal performance & data transfer.

IEEE 1284 Parallel Printer Cable,
A-B, 3m - (96929) GST Inc: **$24**
A-B, Gold 3m - (96930) GST Inc: **$30**

### Firewire Cable F3N400



A high-speed serial bus that bridges the world of consumer electronics and computers. The IEEE 1394 FireWire® Compatible Cable attaches your PC or A/V device to your computer.

6-pin to 6-Pin Cable, 1.8m - (A7782) GST Inc: **$25**
6-pin to 4-Pin Cable, 1.8m - (A7802) GST Inc: **$24**
4-pin to 4-Pin Cable, 1.8m - (A7783) GST Inc: **$37**

**F3U133**
**USB DEVICE CABLES**
A-B,3m (96876) GST Inc: **$14**
A-B, Gold 3m (A7753) GST Inc: **$26**

**USB EXTENSION CABLES**
Male-Female,3m (96879) GST Inc: **$15**
Male-Female, Gold 3m (xxxxx) GST Inc: **$Call**

**F2A046**
**IEEE 1284 PARALLEL PRINTER CABLES**
A-B, 1.8m (96927) GST Inc: **$20**
A-B, Gold 1.8m (96928) GST Inc: **$22**
A-B, 6m (96932) GST Inc: **$50**
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**F3N400**
**FIREWIRE COMPATIBLE CABLES**
6-pin to 6-Pin Cable, 4.2m (A7813) GST Inc: **$45**
6-pin to 4-Pin Cable, 4.2m (A7812) GST Inc: **$45**
4-pin to 4-Pin Cable, 4.2m (B2308) GST Inc: **$45**

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# Intelligent KVM Switches

## Control multiple PCs or network servers with a single monitor, keyboard & mouse

3 Year Warranty

**ServerLink to computer cable**
Each end of the cable fans out into three connectors. 2m cable for **PS/2** mouse, keyboard and monitor (63972) GST INC **$27**

5m cable (63976) GST INC **$60**

2m cable for **AT/Serial** mouse, keyboard and monitor (63974) GST INC **$26**

5m cable (63977) GST INC **$60**



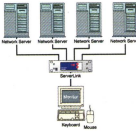
### What is a ServerLink KVM Switch?

The ServerLink range of Auto KVM switches allow you to take full control of multiple PCs or network servers with just one monitor, keyboard and mouse. There is no software to load – just plug in your computers, plug in your monitor, keyboard & mouse and you are ready to go. All ServerLink KVM switches are hardware only solutions totally independent of software and network operating systems. This ensures hassle free installation and error free switching & booting.



On Screen Display

- Select computers via On-Screen-Display or front panel
- Name computers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic computer monitoring
- Standard cables used throughout
- Cascadable to control up to 256 computers
- 8 & 16 port models 19 inch rack mounted design
- Australian designed and manufactured




SERVERLINK INFINITY

PS-2 ONLY

FROM **$270**


SL-421

| | | |
|---|---|---|
| **SL-221** | 2 Port ServerLink Infinity KVM Switch for PS/2 only | (B3047) GST INC **$270** |
| **SL-221-P** | 2 Port ServerLink Infinity KVM inc. 2 x 2m PS/2 cables | (B3048) GST INC **$310** |
| **SL-421** | 4 Port ServerLink Infinity KVM Switch for PS/2 only | (A9890) GST INC **$330** |
| **SL-421-P** | 4 Port ServerLink Infinity KVM inc. 4 x 2m PS/2 cables | (B2759) GST INC **$412** |
| **SL-821** | 8 Port ServerLink Infinity KVM Switch for PS/2 only | (97888) GST INC **$1,069** |
| **SL-821-P** | 8 Port ServerLink Infinity KVM inc. 8 x 2m PS/2 cables | (97889) GST INC **$1,239** |
| **SL-1621** | 16 Port ServerLink Infinity KVM Switch for PS/2 only | (97890) GST INC **$1,796** |
| **SL-1621-P** | 16 Port ServerLink Infinity KVM inc. 16 x 2m PS/2 cables | (97891) GST INC **$2,127** |

ServerLink™

PS-2 & AT/Serial


SL-801

| | | |
|---|---|---|
| **SL-401** | 4 Port ServerLink KVM Switch for PS/2 & AT/Serial | (63724) GST INC **$737** |
| **SL-801** | 8 Port ServerLink KVM Switch for PS/2 & AT/Serial | (63777) GST INC **$1,230** |
| **SL-1601** | 16 Port ServerLink KVM Switch for PS/2 & AT/Serial | (63778) GST INC **$2,069** |

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# Bring Your PC to Life with LifeView




## Capview USB Video Capture

- External USB capture device means there's no need to open up the PC
- Snapshot button for single shot photographs straight from video
- Ideal for portable video-conferencing
- No power supply required, simply plug and play
- 640 x 480 resolution capture

(75943) GST Inc:
**$139**

## RoboCam USB Video-Conferencing Camera



- Capture still images up to 1024x768 or live motion up to 640x480
- Add video to your multimedia presentations, demos or web pages
- Includes Netmeeting, CyberLink VideoLive Mail and ULead Video Studio
- Hardware snapshot button for point and shoot function
- USB interface for quick and easy installation

(B1562) GST Inc:
**$99**

## LifeView FlyVideo 98 PCI TV Tuner




- Record video or television to your hard disk for later playback
- Supplied with VideoMail, for active video content in your e-mails
- Video-conference using any popular conferencing software
- Supports up to 125 channels including cable transmission
- Intel Intercast and Microsoft WebTV ready

(73828) GST Inc:
**$105**

## FlyVideo PCI TV Tuner with FM Radio & Remote




- Supports up to 125 channels including cable transmission
- Record video or television to your hard disk for later playback
- Video-conference using any popular conferencing software
- Intel Intercast and Microsoft WebTV ready
- **Supplied with FM radio tuner and Remote Control Unit**

(73829) GST Inc:
**$159**

## LifeMail PCI Video-Conferencing Kit




- **Full hardware conferencing kit, including camera and capture card**
- PCI Video capture card delivers highest frame rates and resolution
- Supplied with Video Mail software, Video Conferencing and capture software
- Plug and play configuration for simple installation
- Supports Windows 95/98/98SE/NT4

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## Australia's Leading Data Communications Products

### NetComm (A8866) GST Inc: $179 Roadster II 56 Ultra



The Roadster II 56 Ultra is a voice/data/fax modem which lets you transmit and receive faxes and data directly from your desktop. Get on-line in minutes. With UltraConnect technology built-in, this 56Kbps modem negotiates more aggressive transmission speeds which means you surf faster connection. The Roadster II 56 Ultra is a great value package to suit online gamers, small office user and the Internet power user. Its ease of use also makes it ideal for the first time user. Supports Dual K56Flex & V90 Technology · External Data / Voice / Fax and Speakerphone modem · Slim-line design Error correction and data compression, · Distinctive Ring Simultaneous Voice and Data · Maximum speed of 56,000bps (download only), 33,600bps, V.34, V.32bis V.42bis, V.42, MNP2-4, MNP5, MNP10EC, · Plug n' Play



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### NetComm Wave SP56

The revolutionary design of the Netcomm Wave takes up less desk space than almost any other product on the market. Allows you to use your PC just like a hands-free telephone with up to 9 password protected mailboxes. Dual V90 and K56flex compatibility. Simultaneous Voice & Data. Built in Speakerphone and VoiceMail. Digital line protection. Includes headset, desktop faxing and voice software.



(B1388) GST Inc: $218

### NetComm Smart I-Share 56

Allows multiple users, in your business or home, simultaneous Internet access using a single Internet account and phone line • Shared internet access • Intergrated 56K modem • Intergrated 4 port Ethernet hub • Intergrated Firewall • Quick & easy to set up • Supports dial in remote access • Serial port for external ISDN or analog modem · Works with Windows, Unix & LInux operating systems.



(A8868) GST Inc: $459

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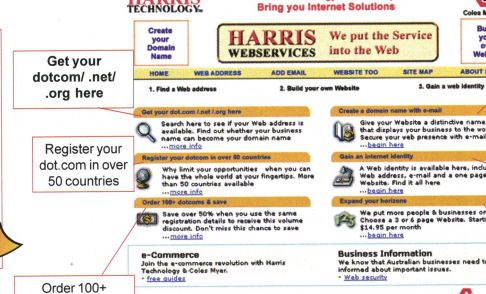
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# Smart Storage Solutions

## HipZip NEW

### Digital Audio Player

(B1436) GST Inc: **$545**

Announcing Iomega's new HipZip™ Digital Audio Player. With its sleek design, this palm-sized player lets you download your favourite MP3 & Windows Media format tunes from the internet, & play them anywhere. The HipZip™ also acts as a PocketZip storage device: download & transport music, spreadsheets, images, etc, up to 40MB per disk.



## zip CD

### CD-RW Internal

Iomega ZipCD Internal drive is the ideal way to store, share and archive information in a common 650MB format. Compatible with Windows 2000. Also ships with Adaptec Easy CD Creator v4.02c and Direct CD 3.01.



**12x4x32**

(A5391) GST Inc: **$605**

**12x10x32**

(B0882) GST Inc: **$570**

## zip

### 250MB USB

(82633) GST Inc: **$369**

Provides high-capacity storage in an easy-to-use format that can go from desktop to laptop quickly and reliably. Sleek new design. Connect via USB port or through PCMCIA card version which requires no additional power cables. Backward compatible with 100MB Zip media



## zip CD

### USB CD-RW External

The ZipCD™ external USB drive reads, writes & rewrites most CD formats. You can use it to record, back up, & share your files. •It's portable & hot-swappable, letting you connect it to all USB-enabled computers without rebooting. •It enables you to record & erase ZipCD™ discs up to 1000 times. •Enable PC & Macintosh® computer users to record, archive, share, & distribute up to 650MB of data on a common CD format.



**4x4x6**

(92623) GST Inc: **$450**

**Drive USB/PC Card Combo**

(82780) GST Inc: **$415**

*Your life is safe here!*

*Storage for life on the go*

## zip

### MEGA TWINS



### ZIP CD & ZIP 100MB

(A5399) GST Inc: **$410**

Introducing the new MegaTwins- the 2-in1 complete data and entertainment storage solution. Offering a ZipCD Internal drive, and a Zip 100MB Internal Atapi drive all in one pack, the MegaTwins is the complete solution for managing your information. Also comes with CD-R and Zip 100MB media.

## clik!

### PC card drive

Removable solution for notebook users. Store, protect and share important information on a 40MB Clik! (1 disk included).



**USB docking station**

(A2306) GST Inc: **$89**

**Drive Mobile**

(76743) GST Inc: **$180**

**Drive PC card & disk**

(78902) GST Inc: **$180**

**Disk 10-Pack**

(75985) GST Inc: **$175**

## zip NEW

### 100MB USB Starter Kit

(A2308) GST Inc: **$245**

**USB Easy to connect.**
**Comes with 3 disks.**
Plug it in, connect the USB cable to the computer, and install the IomegaWare™ software. Done!



## zip NEW LOOK

### 100MB USB



**Zip 100MB disk:** (23772) GST Inc: **$25**

**10-pack:** (21889) GST Inc: **$190**

**Zip PCMCIA SCSI accelerator card** (35145) GST Inc: **$160**

**Zip ISA SCSI Zoom accelerator card** (21888) GST Inc: **$80**

**Zip drive carry case** (31823) GST Inc: **$44**

**Zip parallel cable** (46305) GST Inc: **$35**

**Zip SCSI cable** (46304) GST Inc: **$29**

**Zip disk labels 20-pack** (48059) GST Inc: **$5**

**Zip 6-disk wallet** (35146) GST Inc: **$21**

**Jaz 2GB External Drive** (78941) GST Inc: **$630**

**Jaz 2GB disk** (61662) GST Inc: **$205**

**Jaz 2GB 3-pack** (57271) GST Inc: **$540**

**Jaz 1GB disk** (24218) GST Inc: **$199**

**Jaz 1GB 3-pack** (32844) GST Inc: **$490**

**Jaz PCMCIA SCSI card** (44744) GST Inc: **$215**

**Jaz universal power supply** (35154) GST Inc: **$55**

## See www.ht.com.au/cat/iomega for more info on these products

The folowing items are **Windows ME compatible** • Zip 100 (Parallel, SCSI, ATAPI, USB), • Zip 250 (Parallel, SCSI, ATAPI, USB, Firewire) • Jaz 1GB (SCSI, Parallel, USB) • Jaz 2GB (SCSI, Parallel, USB) • ZipCD (All speeds and interfaces) • HipZip • Clik! PC card drive (PC Card drive and PCMCIA adapter).



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# Next Generation Backup Solutions

## MaxAttach NAS System




*Simplest way to add a File Server to any NT or Unix Network.*

**MaxA40:** 40Gb (A2201) GST INC **$2,124**

**MaxC80:** 80Gb (A2204) GST INC **$5,120**

**MaxC160:** 160Gb (A2205) GST INC **$6,650**

**MaxC240:** 240Gb (A9090) GST INC **$7,969**

**MaxC320:** 320Gb (B2051) GST INC **$9,174**



- Simply plug into your ethernet
- Only 5 mouse clicks to install....
- In 10 minutes you have 40, 80 or 160Gb of disk storage on line.
- Simple Web Browser administration.
- No NT licenses to buy!
- 95/98NT and Unix network compatible
- Now in 1 RU high models (4.5 cm high)
- Disk Spanning, JBOD or Raid level 1 built-in
- Free Reflect-It software to automatically backup you laptops or PCs.

## Backup Software - TapeWare

*TapeWare Lite: Single Server backup for NT, Netware or Linux*




(97849) GST INC **$499**

TapeWare - Loaded with features yet simple to use. TapeWare is simple to install and easy to administer whether you have a single PC or a large enterprise network.

- Quick Start Wizards set up most common applications quickly
- Advanced and predefined scheduling features
- Built in free 6 slot autoloader support
- Desktop, Single Server, Enterprise and Data Centre Versions
- Options for MS-Exchange, Cluster, SQL, SAN etc

## More from Digital Tape Solutions

**Quantum DLT4000/ST**
(70917) GST INC **$2,832**

**Quantum DLT8000/ST.**
(82501) GST INC **$7,158**

**DLTtape media DLT2000XT 15/30GB Tape**
(68362) GST INC **$80**

**DLT4000 20/80GB Tape**
(71231) GST INC **$157**

**DLTclean Cleaning Tapes**
(97851) GST INC **$93**

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## ECRIX VXA-1 Tape Drive

**INTERNAL** (91106) GST INC **$1,759**

**EXTERNAL** (91110) GST INC **$1,995**



- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hr
- SCSI-2 and LVD models available.
- Variable speed operation matches data throughput to your computer
- Packet based technology guarantees reliable restores
- LINUX approved
- Variety of case colours (*White, black, red, translucent)
- Compatible with most backup software

## Benchmark DLT1 Tape Drive






**INTERNAL** (88037) GST INC **$3,199**

**EXTERNAL** (88038) GST INC **$3,730**

- 40GB native, 80GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- Ultra Wide SCSI LVD interface
- Reads DLT4000 tapes (20/40Gb Only)
- Internal or External models
- LINUX Approved
- 7 tape autoloader available
- Compatible with most common backup software
- Standard DLT form factor

## Overland DLT1 Based Autoloader

NEW!



*"Lowest Cost DLT compatible Autoloader on the market"*

- 400 Gb native, 800 Gb compressed capacity
- DLT1 Single Tape Drive included
- 10 tape capacity
- Overland DLT reliability
- LVD 68 pin SCSI Interface
- Includes 1 data tape and cable
- 20 Gb/Hr throughput.
- Optional On-site warranty.

(A0476) GST INC **$9,140**

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# SURROUND YOURSELF WITH THE VERY BEST

## QuickCam™ Express

he simple way to get closer! Meet ace-to-face online by making live ideo calls. Snap and send videos and hotos as easily as you send text. No amera is necessary at the other end hich means viewing is just nother click away!



30121) GST Inc: **$84**

## NEW QuickCam™ Web



The redesigned Logitech QuickCam Web has everything you need to capture video, send video e-mail, make live video calls, post web albums, broadcast over the Internet and more. With its integrated microphone and excellent assortment of easy-to-use software, QuickCam Web is the perfect Internet video camera for everyone.

(A2833) GST Inc: **$163**

## QuickCam Pro 3000

(B0805)
GST Inc:
**$219**



## SoundMan S-20

NEW



Delivers high-definition sound, solid bass for your favourite CD/MP3 songs. Compact, attractive styling. Remote control with headphone jack. Includes digital music CD. 2-year warranty.

(A5011) GST Inc: **$80**

## SoundMan SR-30

NEW



Enhance your multimedia experience with realistic surround sound. Powerful subwoofer and 4 satellite speakers in an attractive package. Remote control with headphone jack. 2-year warranty.

(A5343) GST Inc: **$140**

## MouseMan Wheel Optical

(A3057)
GST Inc:
**$82**



## Feel™ Mouse

NEW

his mouse enhances your omputing experience with gentle brations as you move around e web and desktop. Feel your ay around pull-down menus d dialog boxes. No more sues with too small print or formation clutter, now you can el where your mouse goes!



(A7953) GST Inc: **$79**

## Cordless Wheel Mouse Special Edition

Personalise your mouse with the three different coloured snap-on backs (included). The Cordless Wheel Mouse frees you from cords that catch, tangle and limit your movement. The rounded shape is comfortable for left or right hand. 5-year warranty.



(A2300) GST Inc: **$62**

## Wheel Mouse Optical

(A5318)
GST Inc:
**$54**



## Cordless TrackMan Wheel

(A2157)
GST Inc:
**$99**



## Cordless Freedom Navigator

gitech's digital radio chnology guarantees a liability that other cordless vices just can't match. ouch™ keys offer fast access the Internet and multimedia. cludes Cordless MouseMan Wheel. Year warranty.



(B1477) GST Inc: **$219** NEW

## Cordless Freedom Pro

Ideal cordless keyboard and mouse combination for exceptional comfort, cordless freedom and aesthetic design. The split layout with a gentle curvature makes it easy to use. iTouch™ keys for easy access to the Internet and multimedia. 5-Year warranty.



(B1478) GST Inc: **$199**

## Internet Keyboard

(A8851)
GST Inc:
**$45**





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# Backup and Portable Storage

HARDWARE HARDWARE HARDWARE

**Verbatim Slim-line PC Card DVD-ROM drive.** Ideal for mobile multimedia applications, 8x DVD-ROM drive & 16x CD-ROM reader.



(B2931) GST Inc **$700**

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vintagecellars.com.au

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## Verbatim MirrorSmart - UltraWide SCSIDE Raid Mirror Subsystem

NEW



The MirrorSmart provides complete protection for your important files. Uses RAID1 to allow disk mirroring and rebuilding functions. You will never have to worry about hard disk failure again with the MirrorSmart – providing high data security for a low cost. Features: • Drive Hot SWAP and instant rebuild • Built-in RAID On a Chip(ROC) SCSIDE engine • Uses standard IDE Hard Drives

(B2913) GST Inc **$1,079**

## Verbatim Digital Memory - CompactFlash



With CompactFlash Digital Film you can increase the storage capacity of any compatible digital camera or PDA. CompactFlash card adapters convert CompactFlash into the PCMCIA Type II Card format.

| | | |
|---|---|---|
| 8MB CompactFlash | (B2919) | GST Inc **$66** |
| 16MB CompactFlash | (B2920) | GST Inc **$78** |
| 32MB CompactFlash | (B2921) | GST Inc **$140** |
| 64MB CompactFlash | (B2922) | GST Inc **$244** |
| 128MB CompactFlash | (B2923) | GST Inc **$520** |

## Verbatim Digital Memory - SmartMedia



SmartMedia cards expand the storage capacity of any compatible digital camera. The SmartMedia Card Adapter converts SmartMedia Cards into the PCMCIA card standard and is compatible with PCMCIA Type II sockets.

| | | |
|---|---|---|
| 8MB SmartMedia | (B2914) | GST Inc **$44** |
| 16MB SmartMedia | (B2915) | GST Inc **$78** |
| 32MB SmartMedia | (B2916) | GST Inc **$140** |
| 64MB SmartMedia | (B2917) | GST Inc **$292** |
| SmartMedia Card Adapter | (B2918) | GST Inc **$109** |

## Verbatim FlashPath Floppy Adapters



**Works from your PC's Floppy Disk Drive.**

FlashPath is an electronic device shaped like a floppy diskette – it fits into and works from a 3.5" floppy disk drive allowing you to easily transfer data from your flash media card to your PC by simply using your existing floppy disk drive.

| | | |
|---|---|---|
| FlashPath SmartMedia Reader | (B2924) | GST Inc **$160** |
| FlashPath MultiMediaCard Reader | (B2925) | GST Inc **$160** |

## Verbatim Digital Card Drives

Exchange data between your PC, laptop, or Digital Camera with our range of PCMCIA Readers/ Writers.



| | | |
|---|---|---|
| USB Port SmartMedia and CompactFlash Card Drive | (B2926) | GST Inc **$95** |
| USB Port SmartMedia Card Drive | (B2927) | GST Inc **$95** |
| USB Port CompactFlash Card Drive | (B2928) | GST Inc **$95** |
| USB Port ATA Card Drive | (96056) | GST Inc **$99** |
| Parallel Port ATA Card Drive | (A0064) | GST Inc **$99** |

## Verbatim Slim-line PC Card CD-ROM Drive



***Add a CD-ROM to your Laptop!***

This 24x CD-ROM can connect to any PC Card enabled PC or Notebook and is ideal for mobile computing for notebook users with no CD-Rom drive built-in. The drive is plug-and-play making installation a breeze and the slim-line tray reduces the size of traditional external PCMCIA CD-ROM drives through its lightweight and low profile design. The control panel on the top of the case allows for easy playback of audio CD's.

(97766) GST Inc **$315**

## Verbatim CompactFlash v.90 56k Fax Modem



Add full 56k modem capabilitie to your Palmtop or handhe Windows CE device. Brows the internet or collect yo email from any remot location with a norm phone lin

(B2929) GST Inc **$28**



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# Copying and Connectivity



## Verbatim CopySmart One to One CD Duplicator

### 8x Record, 4x ReWrite, 32x Read




8x Record, 4x ReWrite, 32x Read Stand Alone Duplicator. Introducing the simplest and most affordable way to duplicate a low volume of CD-R or CD-RW discs. Place your original CD in the 32x CD-ROM drive, a blank CD-R or CD-RW in the recorder and then just press start to duplicate the CD-ROM. The CopySmart can also be connected to a Mac or PC for use as a standard external reader/writer. PCI SCSI card and connecting cable included.

(B2904) GST Inc **$1,397**

## Verbatim PCI Firewire Cards




Update your PC with firewire! With the included Ulead Video Software and cable you can download directly from digital video camera to your hard drive. Repeater hubs and cards also available.

| | | |
|---|---|---|
| PCI Firewire Card – 4 ports | (90689) | GST Inc **$172** |
| PCI Firewire Card – 6 ports | (A5161) | GST Inc **$216** |
| PCI Firewire Repeater Card – 5 port | (A5162) | GST Inc **$180** |
| PCI Firewire Repeater – 6 port | (A5163) | GST Inc **$154** |
| PCI Firewire Repeater – 10 port | (A5164) | GST Inc **$204** |
| 6 pin to 6 pin Firewire cable | (B2905) | GST Inc **$33** |

## Verbatim USB Hubs & Cards

USB has been designed to allow many devices to be connected in a very easy way to a PC or MAC. Most new PC's have USB, but plug-in cards can add USB ports to older machines. The use of a hub enables a single cable to be expanded to as many as 6 cables.




| | | |
|---|---|---|
| USB Hub – 6 ports | (79702) | GST Inc **$99** |
| PCI USB Card – 2 ports | (84801) | GST Inc **$44** |
| USB Network Link | (B2908) | GST Inc **$65** |
| USB to Printer Cable | (84803) | GST Inc **$33** |
| Internal 3.5" USB Hub – 4 ports | (B2909) | GST Inc **$99** |
| USB to 10/100 Ethernet Adapter | (B2912) | GST Inc **$119** |

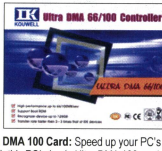
## Verbatim PCI SCSI Cards

Expand and enhance your PC with a PCI SCSI Card. Common IDE drives in today's PC's slow down your machine every time they read or write to a drive. SCSI works almost completely independently of your PC allowing it to run faster during drive activity.




| | | |
|---|---|---|
| PCI Bus, Ultra-SCSI | (90681) | GST Inc **$83** |
| PCI Bus, Ultra-Wide | (90683) | GST Inc **$168** |
| PCI Bus, 2 channel Ultra-Wide | (90684) | GST Inc **$366** |
| PCI Bus, Ultra2-Wide | (90685) | GST Inc **$277** |

## Verbatim IDE Acceleration & Expansion Card




**PCI IDE Ultra DMA 100 Card:** Speed up your PC's new hard disk drives with this PCI plug in Ultra DMA 100 card. Supports transfer speeds of up to 100MB/s with new ATA100 drives, and includes the ability to run up to 4 extra IDE or ATAPI drives on your system.

| | | |
|---|---|---|
| PCI IDE Ultra DMA 100 Card | (90688) | GST Inc **$76** |

## Verbatim Signature III InkJet CD Printer



(89186) GST Inc **$2,650**

## Verbatim Inscripta Thermal CD Printer



(B2932) GST Inc **$5,415**

## Verbatim Composer Autoloading CD Duplicator

(B2433) GST Inc **$4,763**

Optional Inscripta or Signature III printer available.



Conductor-autoloader (B2934) GST Inc **$2,765**

only for Signature III or Inscripta Printer



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## CD-R/CD-RW: Storage for life

Verbatim CD's represent the latest in technology. Featuring a proprietary blue Metal-Azo dye which has the best resistance to sunlight, silver reflective layer for optimum read and write performance and multispeed recording.

MEDIA MEDIA MEDIA MEDIA MEDIA MEDIA



**CD Travel Case**
Lightweight. Scuff proof exterior. Fabric lined disc holders prevent scratching and sticking of CD's.



For 24 CDs: (79583)
GST Inc:
**$18**



For 48 CDs: (79584)
GST Inc:
**$25**

**Headset with Microphone**



Vertical in-ear stereo headphone with adjustable microphone boom. Ideal for notebook users. Designed for multimedia convenience. Lightweight and compact, adjustable headband. (Must be powered by a soundcard)

(77819)
GST Inc:
**$18**

# Verbatim CD Recordable and Rewritable Discs

### CD Recordable - 10 Pack

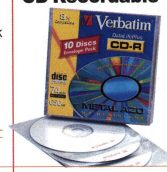


74 Min. 650 MB
1x - 16x, 10 pack

(B2760) GST Inc:
**$17**

NEW!

### CD Recordable - 10 pack in sleeves



74 Min. 650 MB
Multispeed Envelope
10 pack

(A3160) GST Inc:
**$15**

### CD Recordable - Singles

74 Min. 650MB 1x - 16x Singles



(74740) GST Inc:
**$2**

### CD Recordable - Printable Surface

74 Min. 650 MB Printable Surface
1x - 16x, 50 spindle pack



(93471) GST Inc:
**$79**

*Printable surface also available in jewel-case

### CD Recordable - 80 Minute Colors



80 Min. 700MB, 1x-12x, colored CD-R's in matching superslim cases
25 pack

(B1355) GST Inc:
**$39**

### CD Recordable - 80 Minute



80 Min. 700MB,
1x - 16x, 10 Pack

(B1354) GST Inc:
**$19**

700MB

### DataLife Floppy Diskettes



The world's No 1 Floppy Disk
DSHD IBM format 3.5" Floppy Disks

11th Disk FREE!

(79452) GST Inc:
**$6**
*comes in pack

### CD ReWritable

650MB CD Rewritable 2x-4x



(77492) GST Inc
**$4**

650MB CD Rewritable High Speed 4x-10x
(B2658) GST Inc
**$6**

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# Professional Video Tools

## Hauppauge TV













(89063) GST INC **$169**

• Watching Television on your computer has never been easier with WinTV • Watch Live TV (16 Channels) or video on your PC while surfing the Web • Capture motion video and high quality video stills 1600x1200 pixels, BMP, TIF, TGA, GIF, JPEG formats • Video clip capture in Microsoft AVI file format - from TV or any video source • Video conference over the Internet with Microsoft NetMeeting or CU-SeeMe • Win 95, 98, NT 4.0, Win2000 and Linux.

**DV Wizard** (A8925) GST INC **$267**
**Hauppauge TV GO- FM** (89064) GST INC **$209**
**Hauppauge TV Radio** (89065) GST INC **$299**
**Hauppauge TV USB** (89066) GST INC **$270**
**Hauppauge TV USB (with FM Radio)** (98455) GST INC **$314**

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## Hauppauge PVR

NEW

**Personal Video Recorder (MPEG2)**

- Watch and record your TV shows with instant replay and program pause
- Burn your favorite TV shows onto CD- ROM
- Watch TV on your PC, in a window or full screen
- Pause your TV shows, replay them at any time!
- Record your TV shows to hard disk using high quality MPEG2 compression!
- Burn your TV shows onto CD, play them back on your PC, laptop or DVD player!
- Includes FM stereo radio and IR remote control!

**USB COMING SOON!!!**




**PCI** (B2593) GST INC **$669**

## EZDV




**From the makers of the award-winning DVRaptor: Fast, Friendly and Easy DV Editing for your desktop.**

canopus

• Rock Solid DV Codec - Only from Canopus • Compatible with DV & Digital8 cameras • Frame accurate camera control • Easy to learn & use EZEdit software (included) • Captures selected clips or complete videotapes • High speed rendering • SoftXplode 2D & 3D special effects software (included) • High Speed filtering & image enhancements

(97877) GST INC **$595**

## EZDV PLUS with Media Studio Pro V6.0

EZDV now comes with MediaStudio Pro 6.0 video editing software. M.S.P is a complete video editing solution that offers advanced technology, professional productivity and outstanding creativity to make editing professional quality video easy.

(A8924) GST INC **$795**

## DV Raptor

(A8997) GST INC **$1,199**




The DV Raptor bundle includes: the award winning DVRaptor Premiere, SoftXplode: keyframeable 2D & 3D effects

• Raptor Edit: a powerful video editor with real-time "assemble" and "insert" editing and near-real-time transition and title authoring • SmartSound, soundtrack creation software. Impact3D and Adorage software.

** PLUS ** Raptor Bay and all the traditional high quality utilities that have made DVRaptor Australias best selling DV editing system.

**with Adobe Premier 5.1**

(89050) GST INC **$1,399**

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PSION

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# Handheld Portable Computers

PSION revo

*The switched on organiser*

• Unique keyboard design and touch-screen for easy data entry and navigation • Email, agenda, contacts, jotter, phone manager, word, spreadsheet and Internet browser applications • Send and receive email using a compatible mobile phone or Psion 56K Travel Modem • PC Software and docking station supplied for file backup, exchange and synchronization • Print via infra-red or PC • Built-in rechargeable batteries • 8MB memory



(B0667) GST Inc: **$648**

PSION revo PLUS

*Mobile Internet Organiser*

• Enhanced communications with WAP and Opera secure Internet browsers • 16 MB of memory • Unique keyboard design and touch-screen for easy data entry and navigation • Email, agenda, contacts, jotter, phone manager, word, spreadsheet and Internet browser applications • Send and receive email using a compatible mobile phone or Psion 56K Travel Modem • PC Software and docking station supplied for file backup, exchange and synchronization • Print via infra-red or PC • Built-in rechargeable batteries



(B2957) GST Inc: **$869**

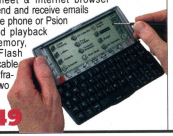


**DON'T FORGET your Fly Buys points**

PSION Series 5mx

*The power to do Business Anywhere*

• Touch-type keyboard for easy data entry and navigation • Backlit touch-screen • Email, agenda, contacts, jotter, word, spreadsheet & Internet browser applications • Send and receive emails and faxes using a compatible mobile phone or Psion 56K Travel Modem • Record and playback voice notes • 16 MB of memory, expandable with Compact Flash memory cards • PC Software and cable supplied for file backup • Print via infra-red, parallel or PC • Powered by two AA batteries



(B0668) GST Inc: **$1,049**

PSION Series 7

*Lighten your workload*

• Large colour touch-screen, Full-size keyboard • Twice the battery life of a typical notebook (8.5 hours) • Email, agenda, contacts, jotter, Internet browser, word and spreadsheet applications • Send and receive emails and faxes using a compatible mobile phone, Psion 56K Travel Modem or PC card modem • PC Software and cable supplied for file backup, exchange and synchronization • Print via infra-red, parallel or PC • Built-in rechargeable batteries • 16MB of memory, upgradeable to 32M



(B0672) GST Inc: **$1,998**

KENSINGTON

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# Smart Design at Work



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## Kensington VideoCam

- E-mail snapshots or videoclips online or chat face to-face with friends or family.
- Tethered camera with 6-foot cord plugs into USB port
- CIF 400 x 300 ppi (4.9" x 4.0" window)



(A1230) GST Inc: **$89**

## Kensington Optical Mouse Pro

- No mouse ball - no moving parts to clean!
- Optical technology offers better tracking & works on any surface
- USB - Plug & play allows hot swapping & PS2 for older system
- Four programmable buttons & scroll wheel to streamline tasks and speed through long documents and Web pages with ease
- Symmetrical design & comfortable shape for left-and-right handed users



(B2943) GST Inc: **$70**

## Kensington TurboBall Trackball



(A1237) GST Inc: **$74**

- Large ball for easy fingertip control and precision pointing
- Unique sculpting helps place hand in neutral position to help reduce risk of injury
- Four customizable buttons offer one-click solutions to repetitive tasks
- Symmetrical design fits left- and-right-handed users and all hand sizes
- Scroll wheel speeds through long documents and web pages

NEW!

## Kensington Graphite SaddleBag

- Three comfortable carrying options-easy grip foam handle, padded shoulder strap, hideaway backpack straps
- Padded computer compartment plus file section
- Quick access plus expandable mesh pocket
- Self-repairing zippers and heavy duty webbing
- Lifetime Warranty



(B2948) GST Inc: **$80**



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# The unexpected extra

## CASIO® PV750

### The Affordable Palm-sized PDA with Wireless Email Capability




**Contacts** - Business, Personal & 5 User files
**Scheduler** - view up to three months or weekly or daily views. Independent alarm for appointments
**To Do & Reminder** functions
**Quick Memo** - up to 5 user files
**Expense Manager**
**Home/World Time**
**Secret function and Games**

**Data Transfer** - data is easily imported to other programs such as Outlook and Schedule+ and has a Quick Copy feature
**Internet Mail** - send, receive and view mail on this pocket viewer. Stores up to 3 mail settings.
**2Mb Flash Memory** - retain data even when batteries are dead
**Download Programs** - Enterprise Harmony for synchronising with MS Outlook, Multiple SMS Program and Phone Book. (available from www.casio.co.jp/English/download/pv/)
**PC Sync** - Easy synchronisation of data with desktop PIM. Cradle and software included.
**Backlight Display** - 160 x 160 dot screen illuminates for ease of use even in low light levels.
**Action Control** - for one-handed operation
**Icon Menu** - Easy Access for often used functions
**Stylus** - All functions are performed by tapping the screen with the stylus. Also used for text input and handwritten memos

**Built-in Email Capability via IrDA port***

(A3560) GST Inc: **$365**

**Web Direct**
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**JK710DC Cassiopeia Digital Camera Card**
(A1581)
**$529**

## CASIO EM500 CASSIOPEIA




### Mobile Multimedia

**SPECIFICATIONS:**
• Colour Display (TFT 65,536 colour, 240 X 320 LCD Screen) • VR4122 150Mhz CPU Speed • 16MB RAM with MMC Slot – SD compatible • Operating System Windows CE V3.0® • SMS, E-mail & Pocket Internet Explorer • Optional Headphone with Remote Control • Optional WAP browser with IrDA connectivity • Optional soft cable modem. **Bundled Software:** MP3 and MS Audio Player (MS Standard), MS Word / Excel / Pocket IE, MS Money / MS E-Book Reader, Casio Movie Player / Picture Viewer, Outlook 2000 (Mobile Calendar / Address) **Power & Weight:** Li-ion Rechargeable battery (approx. 5 hours of operations), Weighs 215grams. **Size:** 128 x 81.8 x 19.25 mm. **I/O Interfaces:** USB (Client) / USB Cable Bundle RS232, Microphone / Speaker / IrDA v1.2, DC jack / Stereo Headphone Jack / Cradle. **PACKAGE CONTENTS** Cassiopeia Unit, Stylus, USB connection cable, Li-ion battery & back-up battery, power adaptor, sync software and instruction manuals. (Specifications & package are subject to change)*

(A3919) GST Inc: **$1,199**

## CASIO E125 CASSIOPEIA




**SPECIFICATIONS:**
• Colour Display (TFT 65,536 colour LCD Screen) • 150Mhz CPU Speed • 32MB RAM with CF Card Slot • Operating System Windows CE V3.0® • USB interface through docking cradle • Easy set of E-mail through wizard. **Bundled Software:** MS Word & Excel, Pocket Money, Pocket IE, Multimedia Application (Audio & Video), Bundling Outlook 2000 & IE 5.0 **Power:** Li-ion Rechargeable battery (approx. 6 hours of operations) **Size:** 131.2 x 83.6 x 20 mm. **I/O Interfaces:** CF Card (Type II), RS232C / Microphone / Speaker / IrDA, DC jack / Stereo Headphone Jack / Cradle. **PACKAGE CONTENTS:** Cassiopeia Unit, Stylus, Cradle with USB connection attached, Li-ion battery & back-up battery, power adaptor, sync software and instruction manuals. (Specifications subject to change)*

(A4107) GST Inc: **$1,375**



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# Kodak

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## Taking Pictures Further

**Kodak Accessories**

**32MB Picture Card**
(62677) GST Inc:
**$176**

**64MB Picture Card**
(82249) GST Inc:
**$272**

**96MB Picture Card**
(88332) GST Inc:
**$426**

**Premium Camera Bag**
(82273) GST Inc:
**$62**

**80 Minute Ultima**
(94493) GST Inc:
**$2**

**Kodak Gold 10 Pack**
(53993) GST Inc:
**$20**

## Kodak Printer PM200

NEW!



**Print you Pictures at Home!**
The most distinctive feature on the Personal Picture Maker 200 is its 1.8-inch, full-colour, LCD preview screen just like those on digital cameras. The fact you don't even need to be connected to a PC, you just insert a memory card from a digital camera (the PPM200 accepts both Smart Media and Compact Flash formats) to print. The preview screen allows you to scroll through all the images on the card, select those to print, choose the number of copies, and in what size and layout.
Although the Personal PictureMaker 200 can function as a stand-alone, it can also serve as a standard computer inkjet printer for all printing needs and is compatible with personal computers using Microsoft Windows 98 and Millennium Edition. It connects easily via a USB port.

(B3084) GST Inc: **$699RRP** SEE WEB DIRECT FOR LATEST PRICING

## Kodak DC4800



For passionate digital photographers or those needing the highest possible quality or the widest creative control. Compact size. 3.3 megapixels - super crisp resolution; prints up to 11"x17". Six image qualities, from e-mail to uncompressed Tif. Loaded with features. Variable ISO settings (100, 200, 400). Wide angle 3x optical zoom plus 2x digital zoom. Lithium Ion rechageable battery (rechargeable in camera). Manual & auto settings. Variable colour balance. TTL AF. Special effects. Lens threaded for additional external lenses. "Burst capture mode."

(A3295) GST Inc: **$1,388**

## Kodak DC3800

NEW!



The KODAK DC3800 Digital Camera is the sleek, high-performance, easy-to-use digital camera. Its small size makes it pocket-perfect. The 2.1MP resolution delivers detailed, vibrant pictures on screen and paper. And the 2X digital zoom lets you focus on what's important. The USB COMPACTFLASH Card Reader makes it easy to upload your pictures and its point-and-shoot design makes it user-friendly.

(B1252) GST Inc: **$850**

## Kodak DC3400



• Two-megapixel resolution means exceptional detail and brilliance – up to 8" x 10" prints. • Its 2X optical zoom delivers crisper close-ups, and its 3X digital zoom lets you get even closer. • User-friendly controls make the DC3400 quick to learn & easy to use. • Zoom Digital Camera, ensuring high quality & no-nonsense performance. • Get connected quickly & easily with its USB and serial cables - it's easy to download, organize, and e-mail your pictures. • Print your pictures with convenience from your own printer.

(A5579) GST Inc: **$819**

## Kodak DC5000



Rugged, durable, and easy-to-use, the KODAK DC5000 will help you get the job done. The DC5000's weatherproof body will hold up under the toughest circumstances. Two-megapixel resolution provides you with excellent picture quality even on 8" x 10" prints. The 2X optical (30 – 60 mm) and 3X digital zoom let you choose wide angle or telephoto to take pictures in a variety of open spaces. All in all, a practical, intuitive package that is as easy to use as a point & shoot, but tough on the job

(A3540) GST Inc: **$1,049**

## Kodak EZ200



Low cost digital point-and-shoot camera that's also a PC/web camera. Compact & light. VGA camera - ideal for easily emailing pictures. Capture short video clips and share via video email. Portable like a traditional camera, but included software also allows camera to be tethered to PC for live video calls. Burst mode for action shots. USB interface. 4Mb internal memory. With removable/ adjustable base to allow full tilting & swivelling.

(A7287) GST Inc: **$220**

## Kodak DC3200

NEW!



Capture fun and spontaneity with the DC3200. One megapixel resolution means eye-catching e-mails and prints up to 5" x 7". Its 2X digital zoom delivers great detail. Two megabyte internal memory and COMPACTFLASH Card capability keeps you shooting longer. And its LCD screen lets you preview your pictures with ease.

(B1255) GST Inc: **$450**

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CM615
17" CRT
1024 x 768 @ 85Hz
(97802) GST INC
$490



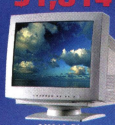



CM811 Plus
21" CRT
1600 x 1280 @ 75Hz
(70914) GST INC
$1,814



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(B1361) GST INC
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(70915) GST INC
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1024 x 768 @ 75Hz
(B3050) GST INC
$1,959



CML170SXW
17" TFT
1280 x 1024 @ 85Hz
(B3051) GST INC
$3,292



CMP307XU
37" Plasma Display
1024 x 768, 0.735MM Pixel Pitch
(A9663) GST INC
$22,340



CM715
19" CRT
1600 x 1200 @ 75Hz
(97803) GST INC
$946



NEW MODEL
CM772
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DuoScan HID (92981) GST Inc: **$3,639**



SnapScan 1212p (74495) GST Inc: **$205**

Document Feeder for DuoScan T1200. (75581) GST Inc: **$400**

Batch Slide holder set for DuoScan T1200. (75582) GST Inc: **$197**



DuoScan T1200 SCSI-2. 36 bit. Transparency scanning. Opt. res. 600x1200ppi (74498) GST Inc: **$1,263**



DuoScan T2500 SCSI-2. 36 bit. Transparency scanning. True opt. res. 1250ppi (74499) GST Inc: **$8,319**

## SnapScan e20

USB

$30 CASH BACK

600x1200 optical resolution (9600 maximum), 36bit, USB interface, Mac & Win98/Win2000Me compatible. Includes 3 interchangeable coloured handles, Software package includes Agfa ScanWise, Readiris and Corel PrintOffice 2000




(B1175) GST Inc: **$180**

## SnapScan e40

USB

$30 CASH BACK



1200x2400 optical resolution (9600 maximum), 42bit, USB interface, 3 interchangeable coloured handles. Agfa bundles Corel Print Office 2000 and Readiris. Corel Print Office makes it easy to create impressive documents and Web pages. Readiris, which recognizes 55 languages, lets users easily convert hard-copy documents — originals, faxes and photocopies—into editable text. All software provided is available in 5 languages, for both Windows (including Windows 2000) and Macintosh platforms.

(A5009) GST Inc: **$314**

## SnapScan e50

USB

$30 CASH BACK



1200 x 2400 optical resolution (96 maximum), 42 Bit, USB interfac Integrated TPO for transparen and negative scanning, 4 fro panel buttons (programmable 3 interchangeable coloured handl and button covers. Agfa ScanWise a comprehensive software package including Corel Pr Office 2000 & ReadIr

(99759) GST Inc: **$379**

## SnapScan Touch

USB

$30 CASH BACK



Agfa's revolutionary SnapScan Touch USB Scanner has four programmable buttons: scan direct to file, email, fax or printer. 600x 1200 ppi, 36 bit, landscape desktop scanner. Comes with 7 translucent coloured handles! Software: Agfa ScanWise, Caere OmniPage LE, Caere PageKeeper (PC only) Micro Frontier Color IT! (Mac only) and Corel Print House

(87209) GST Inc: **$229**

## ePhoto CL18

USB

$30 CASH BACK



Dual Mode: (point-and-shoot digital camera with video conferencing, video clipping and video e-mailing features), VGA (640 x 480 pixels) optical resolution with CMOS sensor, 32 images on internal 2Mb memory (non removable), Optical viewfinder, Built-in Flash, ISO 200, Includes camera cradle for video conferencing, USB interface. Excellent s/w bundle (Twain driver, Corel PrintHouse, Corel PhotoHouse, Microsoft NetMeeting, ArcSoft Videolmpression)

(99757) GST Inc: **$28**

## ePhoto CL20

USB

$30 CASH BACK



1280 x 960 max resolution (with PhotoGenie). Dual Mode: still image and live action. Stores 10-30 images on 1MB internal memory. CompactFlash slot for optional storage on CompactFlash cards (card not included). Built in flash. Extensive software package includes: Agfa Twain Driver, AgfaCam Mounter, Agfa PhotoWise 3.0, ArcSoft Video Impression, MicroSoft NetMeeting, AGFAnet client software, Acrobat Reader

(B1153) GST Inc: **$335**

## ePhoto CL30Clik!

USB

$30 CASH BACK



The fantastic ePhoto CL30 now available with built-in Iomega Clik! Drive. Mega-pixel digital camera with USB interface and a resolution of 1440x1080 pixels. Features an optical viewfinder and 1.8" colour LCD screen. Auto focus lens with 2x digital zoom and macro function.

(89409) GST Inc: **$1,05**

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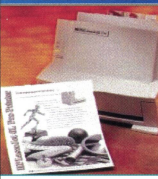
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# LaserJet and InkJet Printers



## HP LaserJet 6l pro

HOT NEW PRODUCT

- 6ppm
- economode cuts printing costs by 50%
- power save mode reduces energy costs
- 18-second first page out
- patent instant-on fuser eliminates printer warm-up time
- fast return to application
- supports a wide variety of media sizes and types (letter, envelopes, transparencies and card stock)
- Supports DOS and Windows 3.1, 3.11,95,98,NT 4.0 environments

(xxxxx) GST INC **$Call**

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## HP Business Inkjet 2250/2250TN

The HP Business Inkjets 2250 and 2250TN come with all the features of the 2200, and also include: • HP PCL5Ce, HP PostScript level 2 emulation • 24MB RAM upgradeable to 88MB • Two 96MHz Motorola processors on board • HP JetDirect 600N internal print server (2250TN only) • Additional 250-sheet input tray (2250TN only)



2250 (A3362) GST INC **$1,320**

2250TN (A3363) GST INC **$1,895**

## HP Business Inkjet 2200

The HP Business Inkjet 2200 has a higher print speed (normal mode) than any other HP inkjet. And, like the other two printers in the range, it's extremely cost effective. • 15ppm black printing, 14ppm colour printing • HP PhotoREt III • HPA™ installed • 250-sheet input tray • 8MB of memory • One 96MHz Motorola processor on board



(A3361) GST INC **$942**



## HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the LJ 1100 into an all-in-one performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm. 2MB RAM.

(70095) GST INC **$699**

## HP LaserJet 1100A Printer-Copier-Scanner

If your business needs require copying & scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button. Scan resolution 600dpi enhanced, 300dpi optical.



(70096) GST INC **$845**

Ask us about the new HP 2 Year Warranty on all HP Laser Jet Printers

## HP LaserJet 2100 Series

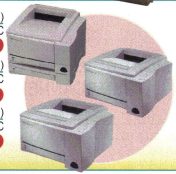
***All models feature:***

- 1200dpi resolution
- 10ppm print speed
- 60MHz processor
- 350-sheet capacity
- 15,000 page monthly duty cycle
- Excellent performance

**LaserJet 2100** (72291)
A fast flexible laser with room to grow. EIO, PCL 6, 4MB RAM.
GST INC **$1,249**

**LaserJet 2100M** (72292)
A fast flexible laser with PS and PCL. EIO, PCL 6, 8MB RAM.
GST INC **$1,399**

**LaserJet 2100TN** (72293)
A complete network printer. EIO, PCL 6, 8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed.
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## HP LaserJet 4050 Series

***All models feature:***

- 1200dpi resolution
- 16ppm print speed
- 133MHz processor
- 500-sheet capacity

**LaserJet 4050** (77443)
PCL 6, 8MB RAM.
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**LaserJet 4050N** (77445)
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### A4 BJC- 3000



• Up to 9ppm print speed black
• 1440 dpi
• Separate replacement colours

(94499) GST INC **$225**

### A3/A4 BJC- 6500



(95962) GST INC **$569**

### LBP1000



10 pages per minute print engine at 1200 dpi resolution. Energy saving 'On-Demand' toner fusing. Cost-saving 'economy' printing mode. Powerful processor to ensure maximum throughput. Memory Saving Technology to accomplish more in less RAM. PCL6 Print Language emulation. Optional genuine Adobe® PostScript® 3™ printer language. Optional second 250 sheet paper feeder. Maintenance free 'all-in-one' toner and drum cartridge. 4 MB RAM standard - upgradeable to 36 MB.

(95983) GST INC **$1,06**

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### BJC-1000SP NEW LOW PRICE

Super Economy Mode in black & white & colour. Vivid colours, on plain paper. Photo Mode colour, optional PhotoRealism. Auto image improvement. Print banners up to 6 A4 pages, envelopes, transparencies, glossy photo paper, high gloss film & T-shirt transfers.



(A1792) GST INC **$99**

### BJC-2100SP NEW LOW PRICE

High performance at a low price - the ultimate printer! Ultra compact design. Up to 5ppm in monochrome. Up to 2ppm in colour. 4-colour photo printing. Optional colour image scanning. Range of driver features. Banner printing. USB + parallel interface.




NEW!

(A3173) GST INC **$149**

### BJC-6200

NEW!

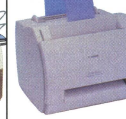
Compact design and uncompromised performance! Up to 10ppm in monochrome. Up to 7ppm in colour. 1440 x 720 dpi. 6-colour photo printing. Sharper, blacker text. Optional colour image scanning. Separate colour ink cartridges! USB + parallel interface.




(A3507) GST INC **$330**

### LBP800

Desktop laser. 8ppm, 300x300dpi, 600x600dpi and 2,400dpi with text and line smoothing. 512K buffer. 2,500 pages per cartridge (5% cover). Win® 95, 98 and NT 4.0.



(83787) GST INC **$480**

### MOST COMPACT, LIGHTWEIGHT FLATBED SCANNERS AVAILABLE!

• OmniPage OCR software included (N650U & N1220U Only) Full Version 9.0
• Plug & Play
• Fully integrated software package

NEW RANGE!



• Silent & fast scanning
• Super slim & compact

**NEW LOW PRICE**

**N650U**
600x1200dpi. (A3522) GST INC
**$160**

**N1220U**
1200x2400dpi. (A3523) GST INC
**$240**

**FB-1210U**
1200x2400dpi (A3524) GST INC
**$419**

### D660U NEW!



With 42 bit output for Windows 98, 2000 and USB Mac Systems. Fast one pass USB scanning. 600x1200dpi film scanning via **film adaptor built-in to scanner lid.**

**D660U**
1200x2400dpi (A8903) GST INC
**$250**

### N640P & N340P NEW LOW PRICE



A4 Full colour parallel flatbed scanner. Fast one pass scanning. Unique LIDE contact image sensor technology. 600x1200dpi. Incredibly thin (39mm), compact stylish desig

**N640P**
1200x2400dpi (A8904) GST INC
**$181**

NEW!

**N340P**
300x600dpi (A8919) GST IN
**$139**

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# HP OfficeJets, DeskJets & CDRW

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## HP OfficeJet K60

Compact, all colour, sheetfed print, fax, scan & copy all-in-one

Print up to 2400 x 1200 dpi colour, up to 600 x 600 dpi black with HP PhotoREt 3

High-quality scanning captures subtle details for accurate reproduction of originals at 600 x 1200 dpi optical (up to 2400 dpi enhanced) and 36-bit colour



(1868) GST INC **$879**

## HP OfficeJet T45

All Colour: Printer, Copier, Scanner & Fax

- 600x600dpi InkJet Printer with HP PhotoRET II
- Up to 9ppm print speed (black) and 6.5ppm (colour)
- 75 speed dials, 55 page fax memory
- Up to 1200dpi enhanced (300dpi optical) scanning, 24bit colour.



(84356) GST INC **$659**

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## HP DeskJet 990C

Best Photo-Quality Plus Premier Business Printing

Infrared printing from PDAs, notebook computers, and other mobile devices.

Up to 17 ppm in black, 13 ppm in color

Optical sensor detects paper type, then selects the ideal print mode HP PhotoREt III



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(1967) GST INC **$799**

## HP DeskJet 930C

Compact Photo-Quality Colour InkJet Printer

- Alternative 2400x1200dpi mode on photo paper with HP PhotoREt 3
- Excellent results on all types of media in all modes
- Prints up to 9ppm black and 7.5ppm colour



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(95761) GST INC **$345**

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| High speed CD-RW disc formatting | HP Fast Format | HP Fast Format |
| Full system backup | HP Simple Backup | HP Simple Backup |
| Multimedia organiser | | Broderbund Multimedia Pro |
| Create stationery, greeting cards & more | | Corel Print Office 2000 |
| MP3 downloads | HP Music Jukebox | HP Music Jukebox |
| CD labelling | CD labeler | CD labeler |
| Included media | 1xCD-R | 1xCD-R, 1x high per, CD-RW |
| Buffering | 2MB | 4MB |
| Able to create all type of CDs | Yes | Yes |
| Able to format CD-RW disc under 3 minutes | Yes | Yes |
| Able to do a full system backup | Yes | Yes |
| Download MP3 files & store on CD | Yes | Yes |
| Download MP3 files onto CD to play in a discman | Yes | Yes |
| A solution with a CD labeler | Yes | Yes |
| Write & read high performance CD-RWmedia | Write- No, Read- Yes | Yes |
| Write & read normal CD-RW media | Yes | Yes |
| Write & read CD-R media | Yes | Yes |
| Part # | (A8090) | (A8087) |
| Inc GST | **$379** | **$560** |

## CDRW 9140i & CDRW 9500i



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# New Phaser Printers

## XEROX 1235N A4 Colour Printer



### A Breakthrough in Laser Class Colour:

- Xerox has built upon existing LED technology to offer the first Xerox network printer that prints in colour at 3 times the speed of 4 pass colour machines
- Dependable, reliable technology
- Faster colour print speed at full 1200dpi resolution

### Remarkable Performance

- Single-pass LED technology prints 12ppm colour, 20ppm mono-colour at full resolution
- 600x1200 dpi in both print modes

### Unrivalled Advantages for Business

- Easy networkability and setup with Auto install
- Additional cost savings by printing short-run produiction of marketing material in-house

(B2971) GST Inc: **$9,294**

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## XEROX 790N A3 Colour Printer



### Exceptional Image Quality

- Outstanding colour control and image quali
- 600x600x8 print resolution, resulting i higher image quality
- Pantone Colour Calibration Matching

### Advanced Performance

- 6ppm colour/26 ppm monochrome
- Powerful 266 MHz Processor
- Built in 6 GB Hard Drive

### Flexibility

- Network ready with 10/100base-T Ethernet and parallel connectivity
- Easy two sided printing
- Netwise 2.0 network management

(B2972) GST Inc: **$14,995**



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# MYOB solutions get your BAS right.

MYOB's market-leading small business solutions are dedicated to saving you time and making it simpler to manage Australia's GST and complete the Business Activity Statement (BAS).

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- Easy to set up & use
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Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later.




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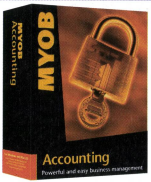
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- BAS & GST READY

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## MYOB Accounting Plus

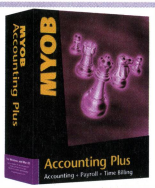
(85772) GST Inc: **$485**

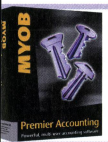
Suited to both service and inventory based businesses with 1-30 employees, MYOB Accounting Plus maintains MYOB Accounting's ease-of-use and extends the functionality to include:

- Fully integrated payroll
- Professional time billing module
- Includes OfficeLink
- BAS & GST READY

The fully integrated payroll feature automatically updates all related accounts the instant a pay is entered - with no tedious importing or exporting of data required.

Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later.




## MYOB Premier Accounting

(85773) GST Inc: **$925**

Includes all the features and functionality of MYOB Accounting Plus with the addition of:

- Powerful multi-user access - includes 3 user licenses, add more at anytime
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**QuickPayroll V8** is a payroll management system (up to 999,999 employees), keeping track of employee pay details, superannuation, tax and group certificates, prints payslips and transfers pay. It calculates tax payable, leave accrued, WorkCover and provides quick access to all payroll information in over 70 different report formats, works seamlessly with QuickBooks to transfer payroll information directly into the company's accounts.




The new functionalities include;

- Tax Tables.
- ABN (company & employee).
- Sundries (reimbursing employees via the payroll and still claiming the GST).
- Transfer GST related information to QuickBooks to produce BAS Statements.
- Fringe Benefits Tax management.
- Voluntary Agreement Tax Scales.
- Ability to print payment summaries incl. interim & monthly payment summaries.
- EMPDUPE file (incl. file-plain paper summaries) to transfer directly to ATO.
- Improved Pay Slip formatting, Enhanced Automatic Report Generator.
- User defined fields.

***SYSTEM REQURIEMENTS***

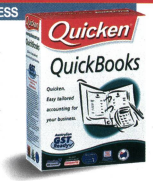
- *An Intel Pentium Processor (Pentium 200 recommended).*
- *16Mb RAM (64Mb recommended).*
- *Windows 95 Service Pack 1 or higher or Windows 98 or Windows NT4 Service Pack 3 or higher.*
- *Hard disk drive with 35Mb free space.*
- *CD-ROM (24x CD-ROM).*
- *A 16 bit sound card and speakers.*

(A2494) GST Inc:

## Quicken: QuickBooks V.7

### EASIER ACCOUNTING SOFTWARE FOR SMALL TO MEDIUM BUSINESS

The QuickBooks software range is easy to install, learn and use, allowing you to get on with the challenges of running your business, instead of spending time on unnecessary paperwork. Powerful, yet easy-to-use features, which include: GST management - tracking GST inputs and outputs; printing your ABN on invoices, etc. GST reporting - printing the information required for your BAS. Double entry accounting (cash and/or accrual). Accounts payable and receivable tracking. Customising invoices, statements and reports for your business. QuickBooks Online Banking - integrated banking with automatic account reconciliation.




(94375) GST Inc:

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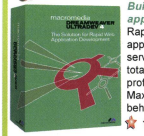
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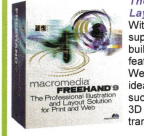

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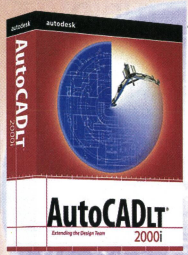
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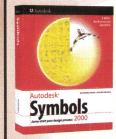
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**FULL VERSION:** (A2432) GST INC **$995**

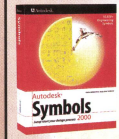
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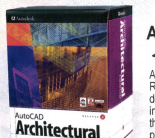
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## AutoCAD Mechanical Desktop *Student Versio

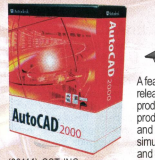
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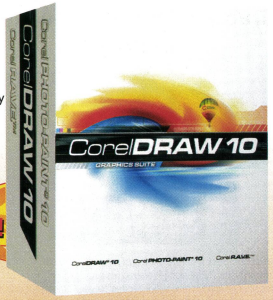
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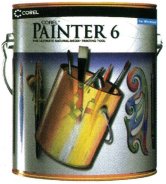
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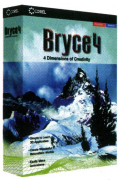
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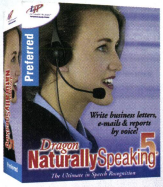
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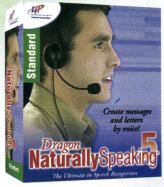



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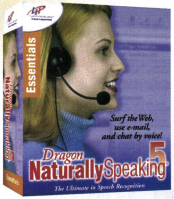
Dragon NaturallySpeaking Standard 5 is a highly accurate, easy-to-use speech recognition product focused on creating text documents and e-mails for home computer users and their families. Make corrections faster and easier with the new, convenient Quick Correct Box. Use Dragon NaturallySpeaking commands with your favourite programs: whenever you see the DragonBar, dictate into any application and use many Dragon NaturallySpeaking commands.

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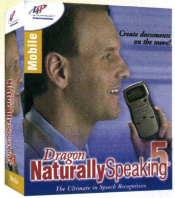



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Dragon NaturallySpeaking Mobile is the go-anywhere dictation solution fo people on the move! The Palm-sized recorder lets you dictate wherever you are. Later, simply plug the recorder into your PC and the software automatically transcribes your dictaiton. The included Dragon NaturallySpeaking Preferred software is a full featured, highly accurate easy-to-use speech recognition product focused on creating and editing te documetns.

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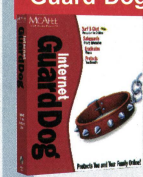



McAfee's Macro Hunter and ViruLogic technology safeguard your PC from ALL virus types and from ALL potential sources

floppy disks ,e-mail attachments, ared files, online services, Internet wnlands, networks, CD-ROM. alysis Microsoft Word and Excel macros, ks and destroys unidentified macro ases and repairs files automatically! ndows Me compatible.

0827) GST INC **$87**

## Guard Dog 3.0




Allows Children to Surf & Chat Safely: Inappropriate Internet content and online chat is a concern for every parent. Internet Guard Dog software protects your family 24 hours a day. Your child won't be exposed to unsuitable discussion or be sending personal information inadvertently. Internet Guard Dog technology provides parents with the ability to manage what web sites their children see online. Parents can block URLs using an objectionable URL and word list.

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All the Utilities you Need. . . With the Simplicity you Want! McAfee VirusScan V5.1- #1 Virus Detection and Removal- VirusScan eradicates all types of viruses from any source. Internet Guard Dog Pro allows children to surf & chat safely. McAfee Firewall- Your defense against hackers attacks. McAfee Utilities keeps your PC running at peak performance by organizing your hard drive & running periodic maintenance checks. Uninstaller V6 identifies & helps you remove unnecessary files that accumulate on your PC. PGP Personal Privacy (Win 95/98 only) allows you to easily scramble information in files, folders & e-mails, so only the intended recipient can read the confidential information.

(A9093) GST INC **$198**

## McAfee Personal Firewall




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Proactive security for consumers' PC Internet Connection
(99780) GST Inc **$45**

**VirusScan 5.0 Deluxe** (A0211) **$94**

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Brings all the precision and durability of IntelliEye Optical technology to a simple, affordable mouse. Revolutionary optical sensor- no mouse ball.

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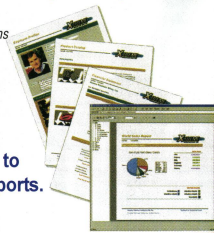
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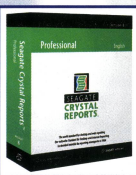
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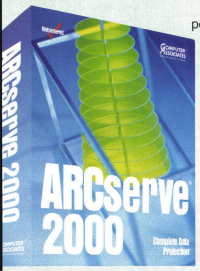
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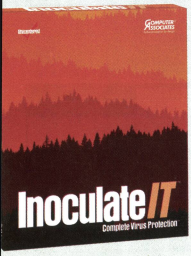

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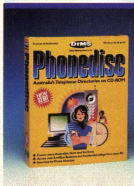

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***8.5 million listings, business and residential Australia wide***

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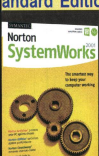
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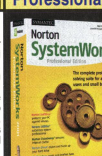

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**Norton Personal Firewall**
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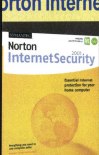



**Symantec pcAnywhere 9.2**
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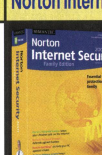
## orton Internet Security 2001 V2.5




This integrated security and privacy suite helps you defend your computer against hackers with Norton Personal Firewall. You also get Symantec's award-winning Norton AntiVirus 2001 software to stop viruses, malicious ActiveX® controls & Java programs, & other dangerous code. In addition, Norton Privacy Control lets you keep personal information from being sent to web sites without your permission, control Internet "cookies," & block banner ads to accelerate download speeds.

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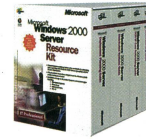
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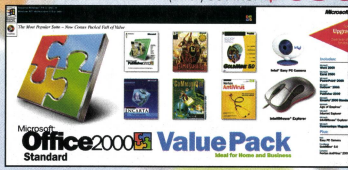
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- **PhotoDraw 2000** - Photo Editing and Illustration package, all in one slick, smooth, and easy to us integrated package

*Train as a Klingon warship captain and take on the Federation.*

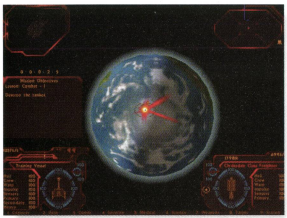
# Space, the final frontier

## Star Trek: Klingon Academy

Most *Star Trek* fans would love to command one of the huge Klingon warships featured in the show. Klingon Academy gives you the opportunity by dumping you into the captain's chair of a Klingon battle frigate.

The game begins after the disastrous chuDegh Offensive, in which many Klingon captains perished. The Elite Command Academy has been established in the hope of restoring the Klingon fleet to its former greatness. You have been chosen to attend the academy, and on graduation you will assume immediate command of a ship and take part in the ongoing war against the Federation.

About 90 minutes of low-quality video footage is used to enhance the plot development and further your understanding of the intriguing world of Klingon politics.







After completing your training missions, you soon learn that commanding a Klingon warship is very different from flying an X-Wing or a jet. These are huge cruisers which require perfect coordination between the many crew members to operate properly. As captain, much of your time is spent ordering your crew to perform various tasks. For example, there is no throttle next to your chair to control acceleration, so you must order the engineer to set a certain impulse speed. When targeting enemies or entering warp drive, you must tell your helmsman which steps to take. This unique command system is controlled through a series of menus. Initially complex, the system soon becomes intuitive, and more importantly, fun.

The immense size of the warships is effectively conveyed by their slow movement and large turning circles. In battle, it is almost impossible to quickly manoeuvre out of trouble, so you must use tactics to gain an advantage over your enemy.

You can avoid trouble by entering one of the game's many different environments. For example, when fighting near a large gaseous star, you can take cover in its cloudy atmosphere. This conceals your location, and also causes significant damage to smaller ships due to the friction produced in flight. Asteroid belts require careful and precise manoeuvring, as collisions with larger asteroids are extremely damaging.

The extraordinary range of environments offered in Klingon Academy is unprecedented in space simulations. However, the graphics engine does not do them justice. Despite the satisfying explosions and accurate portrayal of damage, Klingon Academy's graphics are substandard at best. Many of the large objects are poorly defined, and complex environments often turn into an incomprehensible mess of pixels. The game's lack of support for high resolutions means that the graphics don't compare well with other recent space simulation titles.

There are also flaws in the AI of your enemies and teammates. Your wingmen are usually competent, but ordering them into an asteroid belt will almost certainly mean their death. Enticing enemies to follow you into some of the more difficult environments often leads to a similar outcome.

Klingon Academy is an extremely ambitious game, and in spite of its problems, is a great success. Its unique system of giving orders, its varied environments, the large number of missions and the quality of the plot development all mean the game pushes the space simulation genre to new heights. Trekkies know that too much Star Trek is never enough, but Klingon Academy is certainly worth a look for all gamers.

*Alan Crawford*

**Contact** Interplay
**Phone** (02) 9959 1074
**Online** www.startrek.com
**Price** $89.95
**Requires** Pentium II 233, Windows 95/98, 64M RAM
**Classification** M(15+)
**Rating** ■■■■■■■■■□

## Dino Crisis

Successful console titles have been making their way onto PC for a while now. The latest cab off the rank is Dino Crisis from Capcom, a title that made its PlayStation debut a little over a year ago. A year is a long time in games, and with Dino Crisis it shows.

Dino Crisis's gameplay borrows heavily from the Resident Evil series, and while the survival/horror motif works well with zombies and mutated creatures, it's less successful with dinosaurs and strange research establishments.

Take *Jurassic Park*, mix in a little James Bond, add a touch of *Day of the Dead*, and you've pretty much got the Dino Crisis plot summed up. Crazed scientists have been meddling where they shouldn't — will they never learn?

**Contact** OziSoft
**Phone** (02) 8303 6800
**Online** www.capcom.com
**Price** $79.95
**Requires** Pentium 200, Windows 95, 32M RAM
**Classification** MA(15+)
**Rating**

Graphically Dino Crisis is a big improvement on the Resident Evil model. It has full polygonal buildings and improved character models. Scenes can be rotated and zoomed, which is much more engrossing than the fixed camera perspective of earlier titles. Mind you, there are still sections where you'll be cursing because your character is facing the wrong direction. One element that has survived the transfer to PC is the loading gap between rooms. In the Resident Evil titles, this added some necessary suspense; in Dino Crisis it just slows gameplay down a little, although the transitions are more complex than a simple image of a door swinging open.

Dino Crisis is mildly enjoyable to play. It works well in a console setting, where quality, plot-driven puzzle/exploration games are at a premium. However, on PC, where it belongs to a much larger RPG category, it looks much more mediocre.

*Alex Kidman*





## PGA Championship Golf 2000

Golf can be extremely satisfying and extremely frustrating. PGA Championship Golf 2000 manages to capture both of these elements.

"Here we are on the tee of this longish Par 4; he lines up, and whoosh, straight down the fairway!"

PGA uses a control system called Trueswing, which uses the movement of the mouse to simulate that of the golf club. Smoothly moving the mouse back and forth in a straight line results in a perfect straight drive, while moving the mouse diagonally can result in hooks and fades. This method of control is difficult at first, but it becomes quite intuitive and enjoyable, and is far superior to the standard point-and-click affair.

**Contact** Jack of All Games
**Phone** (02) 9482 3455
**Online** www.sierrasports.com/golf2000
**Price** $69.95
**Requires** Pentium 166, Windows 95, 32M RAM
**Classification** G
**Rating**

"Chipping onto the green now, and he's hooked that into the bunker. This is really going to cost him."

However, PGA is not perfect. The crowd graphics could be better. The fairways and players are shown in 3D, but the crowd is represented by static photographic images which look terrible. The commentary is quite good, but the commentators have an uncanny knack of knowing whether the ball will stray into the rough the instant it leaves the club.

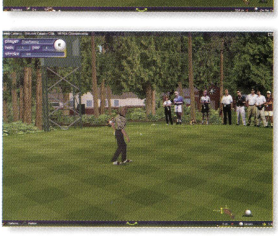
"This is a difficult chip out of the bunker, but look at that — perfect placement on the green."

However, these problems are trivial, and PGA is definitely one of the better golf simulations on the market. Most importantly, the game is extremely addictive, and you'll often find yourself tempted by a quiet 18 holes.

"He taps that easy putt in for par, and I encourage you to join us as we move onto the next hole."

*Alan Crawford*





## Frogger 2: Swampy's Revenge

Frogger 2 is at least the fourth officially licensed property based on the aging Parker Brothers' licence. It's the sequel to Frogger 3D, which attracted a lot of critical acclaim a couple of years ago. Frogger 2 combines the basic Frogger concept (hop, avoid moving things, don't kill yourself) with the 3D styling of the updated version, and adds a plot and some slightly refined graphics. You play Frogger or his girlfriend Lillie, and your mission is to save all the stolen frog children from Swampy the crocodile. Why Swampy doesn't just eat the junior amphibians is beyond us.

It isn't easy being green. Frogger 2 is quite a tricky game, but it will hand out extra lives when the occasion merits it. These usually take the form of flies that can be hopped to or eaten with a deft flick of the tongue. It looks like Frogger and Lillie have been doing their aerobics — they're now capable of super-sized jumps to clear chasms and avoid baddies.

Frogger 2 resembles the arcade classic, but is also a puzzle game. You have to work out where the pesky croc has hidden all the kids. It's an awful lot of fun. As with its predecessor, a multiplayer mode is available. There are also a host of secret levels that can be activated by achieving certain goals, such as finding all the coins on a level (now what exactly does a frog need coins for?).

For those of you who despair of classic old games getting makeovers at the expense of traditional gameplay, you'll be pleased to know that most of the secret levels revolve around the classic single-screen Frogger experience.

Frogger 2 won't appeal to everybody; its gaming style is very old school. However, if that's your thing, it won't disappoint.

*Alex Kidman*

**Contact** Hasbro Interactive
**Phone** (02) 9966 9899
**Online** www.frogger.com
**Price** $39.95
**Requires** Pentium 200 MMX, 32M RAM, 4x CD-ROM
**Classification** G(8+)
**Rating** ▮▮▮▮▮▮▮▮▮▯





## Star Trek: New Worlds

*Star Trek* has probably inspired more disappointing titles than any other gaming licence. With some notable exceptions (such as Klingon Academy, reviewed on page 185), Star Trek titles have been pretty poor, and Star Trek: New Worlds is not an exception.

Following the success of games like Command & Conquer, the 2D real time strategy (RTS) genre produced a flood of derivative titles. It looks like 3D RTS may have the same effect.

New Worlds is not bold, nor does it "go where no man has gone before". Beneath the thin Star Trek veneer lies a generic and wholly unoriginal RTS title. The lightweight story pits the Federation against the Romulans and Klingons for dominion over a planetary system rich in dilithium. The game follows the traditional 4X cycle (explore, expand, exploit, exterminate), but the units may as well be Martian for all their resemblance to Star Trek technologies.

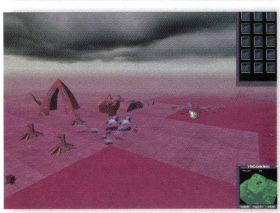
The whole tech tree is available from the opening mission, which greatly diminishes the sense of achievement that usually accompanies successful progress through a multimission RTS campaign.

Units are difficult to distinguish except on the highest zoom level, but then the field of vision is too narrow to see what is going on. The controls are cumbersome and the keyboard cannot be remapped, which is a lazy oversight. The missions are long and tedious, and without a speed setting you are forced to play very slowly. Some of the interface controls are awkward and there is no in-mission saving. This is a game not even Scotty would bother fixing.

*Jon Gill*

**Contact** Jack of All Games
**Phone** (02) 9482 3455
**Online** www.interplay.com/stnewworlds/index.html
**Price** $89.95
**Requires** Pentium II 300, Windows 95/98, 64M RAM
**Classification** G
**Rating** ▮▮▮▮▯▯▯▯▯▯





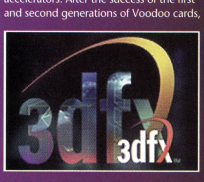
## Gamespy

● Ion Storm's Deus Ex (see our Best Games of 2000 feature on page 190) recently picked up an award for best PC game of the year from the prestigious British Academy of Film and Television Arts. The game has sold extraordinarily well, and word from Warren Spector (who was largely responsible for the game's initial conception and overarching design) is that Ion Storm's publisher Eidos is very happy with the development team. Plans for a sequel have already been announced.



● Tired of using a joystick with your PC? Feeling a little crazy? Got a lot of cash to spare? If the answer to all three questions is 'yes', then you might be interested in UseYourHead, software which allows a human head to be used as a joystick. All you'll need is the software and one of those little Webcams, which tracks your head movements for conversion into game commands. It won't totally replace your joystick or mouse, but it will add an extra something to your gameplay. Exactly what, Gamespy isn't sure.

● Conflicting reports are coming out of 3dfx as to just exactly what the company's plans for the future are. 3dfx started out producing the successful line of Voodoo Graphics chipsets, which were used by third-party hardware manufacturers to create some of the original 3D accelerators. After the success of the first and second generations of Voodoo cards,

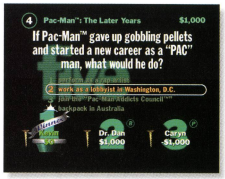


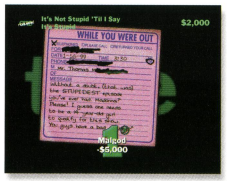

## You Don't Know Jack 2001

Trivia can become an obsession — believe me, I ought to know. No piece of information is too obscure, and just because it's trivia doesn't mean it's trivial. If you're getting all excited at the prospect of this new Sierra offering being another Trivial Pursuit, forget it. Those who take their trivia seriously will be mortified by the totally irreverent and in-your-face You Don't Know Jack.

You get two Jack CDs in this package: You Don't Know Jack Offline and You Don't Know Jack Louder! Faster! Funnier!. Each CD has 1,000 questions that are sure to liven up even the dullest party.

The CDs are fast paced, with *Saturday Night Live*-style banter and a wisecracking host with attitude to move things right along. The animated graphics also add to the entertainment.




In Jack Offline, you can choose to answer sets of either seven or 21 questions. Up to three players can play at a time and each player is assigned a letter on the keyboard as their buzzer. For each question you can choose from three categories on random subjects with titles that have only the most tenuous of links to the actual question. If you found the category titles on the recently axed *Win Ray and HG's Money* an entertainment in themselves, you're sure to find yourself in the same situation with Jack Offline. If you are too slow in picking a question or you get the answer wrong, be prepared for abuse and humiliation from the host. Each question is assigned a money value based on its level of difficulty. If you get a question right, that amount is added to your bank, but get it wrong and the amount is subtracted from your winnings.

There are a number of special question types common to both CDs that can pop up anywhere in each game. First, there are the Multiple-Choice questions, where you pick from a list of four answers. If you are playing with other players and don't know an answer to one of these questions, you have a one-off chance to elect to Screw Your Neighbour, which forces them to answer the question instead. Pissed About a Question are complaint letters from previous players that have been turned into questions. For the Gibberish question, you are given a gibberish phrase and you have to guess which famous quote, saying or title it (allegedly) rhymes with. You get a clue every one-and-a-half seconds, but for each clue received before you get the answer, the amount of money the question is worth drops. If you get a DisOrDat question, you are given two categories and you have to match them with seven items that flash onto the screen. For the Fill in a Blank question, you have to type in the missing word in a phrase or title. Finally, the Jack Attack question is the last question of every game and is another matching game.

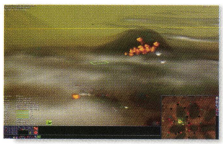
Jack Louder! Faster! Funnier! has one additional category called Wendithap'n. For this category you're given an event, and from a list of other events you have to pick which ones happened before or after the given event (or never happened at all). Jack Louder! Faster! Funnier! also has a different question structure to Jack Offline. Each round follows a theme you nominate from a list of three categories.

Jack's big drawback is its US-centricity. If you're big on US history, brand names and pop culture, you'll have a huge advantage over other players. Hands up how many of you know what Lick-a-Stix are? And I still think that the correct answer to the question on Blue Laws was pornography, not legislation that prevents shops in the US from opening on a Sunday. I might just register my protest with Pissed About a Question.

***Gail Lipscombe***

**Contact** Jack of All Games
**Phone** (02) 9482 7920
**Online** www.ydkj.com
**Price** $69.95
**Requires** Pentium 90, Windows 95, 16M RAM
**Classification** MA(15+)
**Rating** ■■■■■■■■■

## Wartorn



This new game from Australian-based Eyst is refreshingly original. Dispensing with the cookie-cutter plots that characterise most 3D RTS games, Wartorn is based on the idea of warfare as sport. Its futuristic battles take place in giant arenas before bloodthirsty crowds. Instead of dressing up the game in a convoluted plot, Wartorn gets straight down to business: one-on-one gladiatorial combat using the most potent armed forces you can muster.

Flexible play style is a dominant feature of this game. You can play in full strategy mode, with conventional resource management requirements, or in skirmish mode, which dispenses with resource management. Instead, you have a fixed budget to buy your units with. Both modes can be played in a real time or turn-based setting.

You choose which country you represent and which arena the battle takes place in, which has a significant effect on how the battle is played. There's also an attack planner which allows you to orchestrate your manoeuvres according to a rigid timeline. These options give the game flexibility and depth.

The game's innovative approach isn't extended to the gaming engine. Release delays mean that Wartorn looks a bit dated. This is evident in the amateurish opening movie and in-game graphics which are blocky and lack definition. The units' AI can also be frustrating. Despite these problems, Wartorn is still a satisfying experience.

*Jon Gill*

**Contact** OziSoft
**Phone** (02) 8303 6800
**Online** www.wartorn.com
**Price** $79.95
**Requires** Pentium II 233, Windows 95, 64M RAM
**Classification** G
**Rating** ▮▮▮▮▮▮▯▯▯▯

## RollerCoaster Tycoon: Loopy Landscapes



Loopy Landscapes is the latest expansion pack for Microprose's unbelievably successful theme park simulation, RollerCoaster Tycoon. More than a year after its release, it's still riding high on the US sales charts, beating Quake III and the like.

RollerCoaster Tycoon combines the fun aspects of micromanagement (encouraging creativity in design) almost perfectly with a fast and easy-to-use interface. Loopy Landscapes doesn't tinker with this winning combination. It simply adds a few wrinkles to the overall interface, the most significant of which is the option to apply pricing changes across a range of vendors. This is very handy if you've got 15 burger stalls and want to charge $27 for a burger. You too can emulate the Sydney Olympics.

Loopy landscapes adds new attractions, rides and rollercoaster pieces, along with new challenging scenarios including a few real-life British theme parks. It's a pity there still isn't a 'free play' option, where you have free rein to be creative (like most of Maxis's sim titles) but the new challenges — from frozen Arctic parks to boiling desert ones — are still an awful lot of fun.

Loopy Landscapes is the second add-on for RollerCoaster Tycoon. If you haven't got the first pack (Added Attractions), it's included in Loopy Landscapes, so you don't miss anything.

It's refreshing to see an add-on pack for a good title that doesn't break the stuff that works, or charge a new game price for a few tweaks. Good stuff.

*Alex Kidman*

**Contact** Hasbro Interactive
**Phone** (02) 9953 8788
**Online** www.rollercoastertycoon.com
**Price** $39.95
**Requires** Pentium 90, Windows 95, 16M RAM
**Classification** G
**Rating** ▮▮▮▮▮▮▮▮▮▯

3dfx decided that it would be more profitable for it to manufacture its own cards. However, profits have been slowly declining over the last six months. It now seems that they are going back to square one, and will once again be creating the core chipsets for sale to outside manufacturers.

● The second annual Australian Game Developers Conference was recently held in Melbourne and showcased some of the emerging talent in the local development scene. The event centred around a number of speeches and presentations by some of the big industry names, with representatives from American and European companies (such as Valve, Infogrames, Nihilistic, Sony Computer Entertainment Europe, Relic and Microsoft) as well as perspectives from local houses such as Ratbag Games, SSG, Micro Forté and Torus Games. Topics discussed were incredibly broad, ranging from AI design to making it in the industry.

● Recently, Gamespy managed to get hold of an early version of the upcoming RPG Arcanum: Of Steamworks and Magick Obscura, currently in development by Troika Games. Troika's founders were also principal designers on Interplay's Fallout, heralded by some as the best RPG ever made, so expectations have been high for their new game. Set in a 'steampunk' world (a cross between traditional RPG elements and the early Industrialisation), even in its rough form Arcanum looks to be another classic, with incredibly in-depth character generation and NPC interaction as well as an extensive array of spells and steam-based technologies to play with. The expected release date is February/March 2001; more information can be found at www.sierrastudios.com/games/arcanum.



**For more games news, check out Gamespy every Friday on apcmag.com.**

# Best games of 2000

*This last year has been another great one for PC gaming. The continuing renaissance in role-playing games and a number of innovative new titles gave everyone in the* APC *office plenty of excuses to neglect their work. We give you the lowdown on the best games from the past 12 months (and CD 2 is packed with demos, so you can try them for yourself!).*

## Baldur's Gate II



What can we say about this little gem that hasn't already been said? This huge game continues the epic plot of its predecessor with an improved story-line, higher resolution graphics and the same depth of gameplay. There are so many subquests and plots that it's theoretically possible to play this game for years. Baldur's Gate II is a must for role-playing fans everywhere.

## Diablo II



Blizzard did a great job with this sequel to its 1996 hit. There are more character classes to choose from (ranging from Amazons to sorcerers), and a much bigger play arena. As in all Blizzard games, excellent cut scenes frame the gameplay nicely, and of course, we can't forget the improvements to multiplayer gaming. Blizzard now has secure servers to eradicate cheats.

## The Sims



Renowned for titles such as SimCity, SimTower and SimAnt, Maxis releases strategy simulation games of consistently high quality with addictive gameplay. The Sims is no different. This time you have direct control of people's lives, and must manage everything from their careers to their consumer habits. Manipulating the lives of your Sims can be so addictive that you might begin to neglect your own.

## Deus Ex



This game proved hands down that Ion Storm (at least its Austin-based office) is capable of creating absolute classics. Warren Spector and his team did a spectacular job with this one, blending role-playing and action elements with a conspiracy-laden plot. Deus Ex is a huge game, with expansive levels and multiple plot twists that always keep the player guessing. The best news is that Ion Storm has a sequel to Deus Ex in the works.

## Soldier of Fortune



This gore-laden title from Raven puts you in the shoes of a mercenary hired to stop terrorists who have stolen four nuclear warheads. Pretty standard fare for a 3D shooter, but what makes Soldier of Fortune so revolutionary is its ability to recognise location-specific damage. This means that if you shot somebody in the leg, they start limping; in the arm and it becomes useless.

## Homeworld: Cataclysm



This standalone mission pack follows on from the 1999 space-based 3D real time strategy game from Relic and Sierra. This time, you are in charge of a small kiithid faction that finds itself in conflict with a great evil known as The Beast. With more of the intense gameplay that made the original such a hit and a new story-line driven by topnotch voice acting, this is easily one of the best real time strategy titles of 2000.

## Thief 2: The Metal Age



It must be said that the now-defunct Looking Glass Studios sure knew how to go out with a bang. The company had two hit games, System Shock 2 and Thief 2, on shop shelves when the unfortunate news of their closure (the company had overstretched its budget) shocked fans around the world.

A 'first person sneaker' game, Thief 2: The Metal Age is so rich with atmosphere that at times it can genuinely scare you. Thief 2 continues the adventures of Garrett, the master thief. Stealth and quick wits are essential to Garrett's survival. A new story-line and improved level design make this game totally absorbing.

## Crimson Skies



This is an action-oriented flight sim from FASA (the creators of the MechWarrior universe) and Microsoft. Set in an alternate 1930s, the US has been divided into a number of warring states and flight has become the main mode of transport. You take the role of dashing air pirate Nathan Zachary, a sort of airborne Robin Hood.

Fast-paced dog fights characterise the game, but it doesn't have a lot of detailed flight controls. In this sense, Crimson Skies isn't a straightforward flight sim.The game features some great graphics and gameplay, and a strong story-driven single player campaign, as well as a multiplayer option over a LAN or the Internet.

## Vampire: The Masquerade – Redemption



Based on the pen and paper role-playing game of the same name, Vampire was one of the most widely anticipated titles of 2000. The game begins in the Dark Ages and spans several eras. You play Christof, a knight who is turned into a vampire. You must spend the centuries fighting to retain your humanity or else become a monster. Vampire is a great-looking game, with very smooth animation and convincing textures. You can use your mouse to pan around the action.

With gorgeous graphics and a combat-oriented play style, this was one of the best games of the year, although not quite the classic everyone was hoping for.

## Icewind Dale



This is another great role-playing game from Black Isle Studios and Interplay. This game focuses on more frenetic, Diablo-esque, hack 'n' slash gameplay, but it still manages to retain the same depth that made Baldur's Gate so successful.

The game takes place in the same world as Baldur's Gate, but this time it's in the frozen north, with a host of newer and bigger monsters to fight and stunning frostbitten new environments to explore. Icewind Dale was released about the same time as Diablo II, and it's a testament to the title's strengths that it managed to give the latter a real run for its money.

## The best of the rest

**Messiah**
**Theme Park World**
**Grand Prix 3**
**Shogun: Total War**
**Pharaoh**



## Didn't make the cut

**Sydney 2000**
**Star Wars: Force Commander**
**Star Trek: New Worlds**
**Stephen King's F-13**
**Daikatana**



## On this month's cover CDs

**Deus Ex**



**Homeworld: Cataclysm**
**Theif II: The metal Age**
**Vampire: The Masquerade — Redemption**
**Soldier of Fortune**



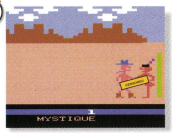
**Crimson Skies**

# Worst ever games

*We've played a lot of games at* APC. *Sometimes we wonder why.*

## Custer's Revenge (Atari 2600)

It has rape, pixelated penises and poor control. Yup, it's the world's first tasteless game. Actually, it could just be the world's *most* tasteless.




## WCW Thunder (PlayStation)

Wrestling may be popular, but this game shouldn't be. Just hope that your PlayStation is struck by lightning to save you from having to keep playing.





## Postal (PC)

This game is banned in Australia, and you can just be thankful that it is. Shooting games can be fun, but mindless rage games are just dull.



## Ken's Labyrinth (PC)

The demo on this month's cover CD should tell you everything you need to know about why some FPS games need to be shot.

## ET (Atari 2600)

This is the game that sank Atari. Marvel at ET's amazing powers of neck extension. Be dazzled by his awesomely glowing finger. Then give up.



## Star Wars: Force Commander (PC)

The single worst RTS game of all time. In 3D! With Star Wars! Being stuck in a box with Jar Jar would be more fun.





## Trespasser (PC)

Jurassic Park meets Jurassic dreck in this disastrous first person shooter. It's uninspired, hard to control, and lacks dinosaurs.

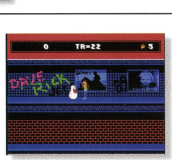


## Myst/Riven (PC/Mac)

Click on the pretty picture, decipher the puzzle, and repeat. Then you can cash in on a sequel because the first was so rivetting. Yawn.

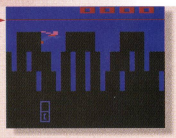
## A Boy and his Blob (NES, Gameboy)

Even worse than it sounds. It's from the creator of that all-time classic, Pitfall. We can't figure out what went wrong.




## Bad, but not *that* bad:

- Any Superman game
- Any Spawn game
- Lands of Lore 3
- Deus
- The War in Heaven



# Online music out of tune

*Once touted as the future of retailing, Net music sellers are now being forced into deals with the very shops they were supposed to destroy.*

On the surface, it looked like any other distribution deal. In late November, Australian online music store ChaosMusic announced that it had signed a deal with music distribution group Leading Edge. Leading Edge services 225 independent music shops around Australia and has an estimated 17% share of the retail music market.

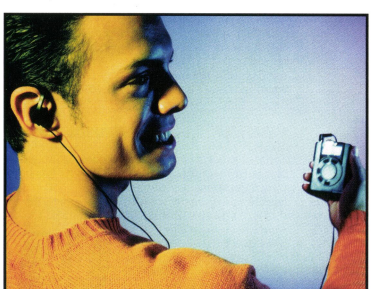
ChaosMusic officials predicted that the deal would give the site access to cheaper supplies of music and reduced credit charges. It would also allow gift vouchers purchased on the site to be spent in any shop in the Leading Edge network. This might seem like sound business sense, but it illustrates the extent to which music etailers (like most other ecommerce outfits) have found themselves forced to do deals with conventional bricks-and-mortar chains, and the retail networks that serve them, to survive.

It wasn't always like this. When ChaosMusic launched, it spouted plenty of rhetoric about how online fulfilment would allow it to offer far cheaper prices without the expenses associated with a physical retail presence. At the time, the site even used a US fulfilment group to ship its CDs, minimising its investment in inventory.

However, increasing competition from retail shops and a general distrust of ecommerce stocks in the post-shakeout market has seen ChaosMusic switch to a mixed strategy — often described as 'clicks and mortar'. ChaosMusic already has a partnership with the Strathfield mobile phone and car stereo retailing group and is establishing 'virtual shops' in 70 of its outlets. These allow orders to be placed with the site through kiosks. In 1999, it purchased Melbourne music retailing icon Gaslight. The Leading Edge deal now firmly places ChaosMusic's distribution focus in Australia, rather than overseas.

All of this provides some support for ChaosMusic in its battle with key local rival, Sanity. Sanity has a total of 260 shops across Australia, including its subsidiaries Dance Arena and IN2 Music. It has also aggressively promoted its own site, Sanity.com.au, while seeking to tie the site in closely with physical shops. Sanity has made several ventures into the 'virtual music space', including a joint venture to form WiredRecords.com, an online distribution system for digital music, and a separate float for its Web site division. However, its key focus remains its retail shops, which dominate the Australian music market.

Many of Sanity's promotional activities aim to increase traffic between the site and physical shops. For example, a recent promotion with Arnott's allowed



purchasers of biscuits to order free CDs from the Sanity site by collecting tokens, but also offered them discounts on a special compilation CD which could be purchased in shops.

When Net music shops first launched, cheaper prices were supposed to be one of the main attractions. However, a quick surf around some Australian sites shows that the online world now tends to mirror the real world: the cheapest place to buy CDs isn't in music shops at all, but in mass-market chain stores.

For instance, *APC* found Ricky Martin's recent album *Sound Loaded* selling at ChaosMusic for $28.95, a very slight discount on the typical $30.95 price tag for a new release CD. At Sanity, the same disc cost just $26.95, reflecting the company's greater buying power. However, both businesses were beaten by Coles Myer-owned Target, which offered the disc online for just $21.60. This is a price that specialist music retailers are unlikely to match, even if their stock range dwarfs that of sites such as Target.

## Download upside

If there's one advantage that pure etailers have over bricks-and-mortar chains, it's that they may be better positioned to move into digital music. As people become more accustomed to downloading MP3s, having an online brand presence might be more important than a physical one.

This point was underlined in a recent study by APT Strategies that found that well-known, 'real-world' brand names were overshadowed online by Net brands such as ChaosMusic, Amazon.com and CDnow. Many big companies have spent large sums of money trying to redress this balance. However, a perception that the traditional shops are in league with record labels may put off the Napster crowd, many of whom disapprove of any form of music retailing.

Whether there's a business model underlying the trend towards digital distribution remains to be seen. Despite many pioneers of digital music distribution having reached settlements with record companies (for example, Napster's recent deal with BMG, and MP3.com's settlements with a host of record labels), free trading of music continues online more or less unabated. Whether the millions of people currently using these services will be willing to pay for them is a moot point, but one on which the future of music retailers depends.

*Angus Kidman*

*Build brand loyalty and enter the imaginary worlds of the Otherland network and the Cybercage.*

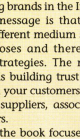
# Stand by your brand

## Firebrands: Building Brand Loyalty in the Internet Age

Some things aren't easy to recreate online. As this book explains, brand loyalty is one.

The authors have produced an excellent guide to building brands in the Internet age. The key message is that the virtual world is a different medium serving different purposes and therefore requires different strategies. The most important strategy is building trust networks, not only with your customers, but also with partners, suppliers, associates and even competitors.

The first part of the book focuses on brand fundamentals. The book strikes a good balance between educating the uninitiated and guiding and stimulating more experienced marketers and brand managers.




The sound theoretical base is explained through case studies of successes and failures, diagrams and illustrated models.

*Firebrands* is not about marketing on the Web, and definitely isn't for the faint-hearted. Authoritative and comprehensive, it offers practical advice for building a successful brand in the 'networked economy'.

Anyone building an ebusiness or investing in one will find this book useful. Whether you are involved in an Internet company or are trying to put a "dot com mojo" on an existing offline brand, *Firebrands* is essential reading. As the authors suggest, your company's success depends on how well you build brand loyalty in the Internet age.

***Cathie Kennedy***

**Authors** Michael Moon and Doug Millison
**Publisher** Osborne/McGraw-Hill
**Contact** McGraw-Hill
**Phone** (02) 9415 9888
**Price** $49.95
**ISBN** 0072124490
**Rating** ■■■■■■■■■■

## Cybercage

Aimed at the young adult market, this novel is an entertaining tale. In the story, the AI system controlling a near-future court complex is subverted to allow a pair of convicts to escape from custody. The story is interesting and entertaining, but it has several shortcomings.




First, the language has an irritating mid-Pacific flavour. Americanisms such as "working like a baseball catcher's mitt" sit uncomfortably alongside local terms such as "ambo" (as in ambulance crew member). Second, although technobabble is a science fiction tradition, lines such as "It probably launched a fractal decryption response" aren't convincing enough.

Stereotypical characters abound: there's a scrawny nerd, a blonde glamour girl, a handsome young cop, and an Asian martial artist. The main protagonist is a female computer freak who has psychic nightmares that reveal the future. Judging by the other characters, Higgins probably chose a girl because teenage girls read more than boys do, not because he wanted to avoid stereotypes.

The story even falls back on the old standby of confusing a supposedly intelligent computer with a pair of logically inconsistent statements.

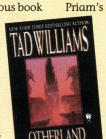
Readers who take this tale at face value and don't read too critically will probably enjoy it.

***Stephen Withers***

**Author** Simon Higgins
**Publisher** Random House
**Contact** Random House
**Phone** (02) 9954 9966
**Price** $16.40
**ISBN** 0091839718
**Rating** ■■■■■■■■■■

## Otherland: Mountain of Black Glass

Tad Williams's Otherland series is unusual in that each successive book picks up at the exact moment the previous book left off. The four-part series is really one long narrative, of which Mountain of Black Glass is the third part.




The series deals with a mysterious virtual reality called the Otherland network. The network is crippling millions of children worldwide, capturing their minds online, but leaving their bodies to helplessly waste away in the real world. Also caught within the network are a diverse group of people trying to solve the network's mysteries, save their families and shut Otherland down before it does any more damage.

As this third book begins, Renie and !Xabbu's group are caught in an unfinished simulated world with no way to exit to the next one. Dread, in the form of Quan Li, has vanished from their world, but still lurks within the network. Orlando and Fredericks are inside the Egyptian world, very close to Osiris's seat of power. Paul Jonas is travelling solo towards Troy and Priam's Walls, where the mysterious birdwoman Vaala and his identity lie.

In the real world, Catur Ramsey, Sellars, Christabel and Olga Pirofsky are also investigating the Otherland network. Police officers Stan Chan and Caliope Skouros are closing in on Dread.

Fans will welcome this addition to the series as it answers some of their questions. Some of the groups opposed to the Otherland network join forces, and revelations are made.

***Darren Ellis***

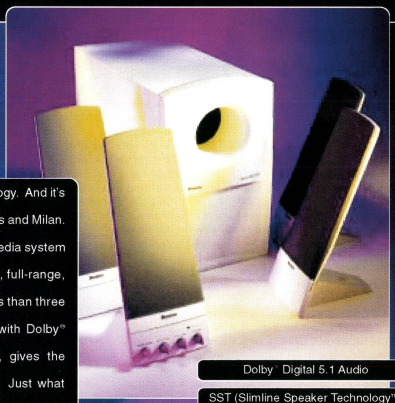
**Author** Tad Williams
**Publisher** Orbit
**Contact** Penguin
**Phone** (03) 9871 2400
**Price** $18.50
**ISBN** 1857239903
**Rating** ■■■■■■■■■■

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Boston

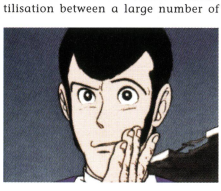
# Sound experiments

When five guys started Clan Analogue in Sydney back in 1992, the emphasis was very much on analog synthesisers. The collective has expanded over the years to incorporate artists from all forms of electronic music and video, and most members now use digital equipment. However, there is still great affection for vintage analog equipment (for example, the Roland SH5 and SH101 monosynths rate a front page mention on the Clan site).

"The biggest user of old analog gear would probably be Null Object," Clan member Russell Jasper said. (Check out Null Object's MP3 on this month's cover CD). "An interesting turn of events now sees these old synths being made virtual on the PC through software. Many classic synthesisers from the '70s are replicated right down to the wood panelling on the screen in front of you. Of course, now you click the syntheiser's keys with a mouse instead of your fingers."

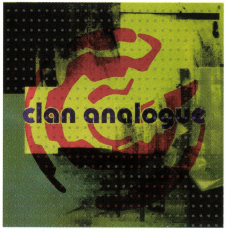
The gear may have changed, but the idea behind Clan remains the same. "Clan's major objective is to keep fostering new talent and provide cutting-edge electronic music and visuals. Our biggest achievement has been to grow and continue to deliver diversity and quality."

On his Web site, Clan Analogue member Scott McPhee (Nerve Agent, systemx.autonomous.org/nerveagent) describes how the collective has revitalised Sydney's electronic music scene and influenced his own work. "It broadened the horizons of many people interested in hearing eclectic electronic sounds on record and as spontaneous, live collaboration. It brought a spirit of experimentation to those of its members making more conventionally structured dance music, and taught the experimentalists the value of great electronic vibe. It allowed a serious cross-fertilisation between a large number of people working alone and together, and in different media. And it created a vital self-publishing system that reduced an individual's costs by releasing collectively."



Clan has spread throughout Australia. It now consists of groups of electronic sound composers, visual artists, coders, DJs, video artists, writers and designers in Brisbane, Perth, Canberra and Melbourne, as well as Sydney. Each group meets, collaborates, puts on dance parties and organises live performances.

"Clan has always been about performing live, and this has included having VJs doing live visuals. When Clan started, it did a weekly club night called Electronic. This gave many people their first taste of seeing electronic music performed live. After many years and a few venue changes it was decided that the energy we were putting in each week was too great and we decided to do one-off parties instead. Perth Clan is now regularly holding events and so is Clan Melbourne," Jasper said.




"We are also proud to have a Sydney radio show, which has only ever played Australian-made electronic music." (*Audioplastique* is on 2SER, Wednesdays at 2pm.)

## On the record

Clan has been releasing recordings in various formats since 1993 — from floppy disks and CDs to cassettes, vinyl and video. The group operates its own independent record label, and its diverse catalogue reflects some of the changes the group has been through. "We've had hard stompin' techno on the early vinyl EPs through to the dark experimental ambience of one of our first CD releases, *Aphelion One*, and the very dance floor-friendly *Twenty Disco Greats*."



Clan Analogue CDs are distributed by Festival, but decisions about what to release are made by the group. Everyone is welcome to submit tracks for compilations, which are double-CD releases so that the maximum number of tracks can be included. Various members decide which tracks to put on the CD. "Who decides is different for every release, so we don't just keep releasing one person's taste. *Cognition 3* tracks were chosen by Kazumichi Grime from Sydney and Nic Toupee from Melbourne. This way, any filtering at least comes from ourselves."

Members fund their own individual recording and publishing projects, and no artists are actually signed to the Clan label. "Members are free to release stuff on whatever label they like. Many acts that started with Clan have gone on to bigger things, but still don't mind playing at the odd Clan gig."

Of the dozens of acts involved with Clan Analogue over the years, B(if)tek is the most famous. In B(if)tek's early years, members Kate Crawford and Nicole Skeltys were actively involved in Clan Canberra. The band is now signed to Murmur, a division of Sony which has released records by the likes of silverchair, Jebediah, Lo-tel and Something for Kate. The Murmur site describes them as "the female electro act", but they don't really need an introduction. Their pop star credentials include having several singles on high rotation on Triple J, an ARIA nomination, a supporting role on the Beastie Boys' 1999 Australian tour and a site dedicated to taking the piss out of them (biftekked.com).

*Jasper Russell spoke to* APC *about the artists and methods behind the music of Clan Analogue.*

## Electric dreams

Many Clan members have a passion for technology, and a disproportionate number work in IT. As Jasper says, "It helps to be able to afford new toys."

"The nature of electronic music and video means you can't really be afraid of technology. The DIY ethic is part and parcel of this. Universities try to keep up with what's going on, but if you want to learn about digital video production or electronic music composition, you really have to get the equipment and/or software and try it!"

Clan artists have been quick to exploit the possibilities of MP3 and most members who write music have tracks available for download either on their sites or on sites such as MP3.com. "One Clan act, Pempek, has done a collaborative track with Albert Martinez entirely over the Net, using MP3 files and Steinberg Cubase VST 3.7. It took about four weeks." The track, called 'Flutes', is included on the cover CD.



Many members have well-maintained Web sites, but the Clan site is due for a major overhaul. "The Clan Web site needs to have better connection to these, and to showcase our products and activities better. We have very skilled and talented Web people within Clan, if only they didn't have day jobs!"



## Getting together

Each state group meets regularly, so members can have 'show and tells', but Clan members keep in touch mainly by email. There is one mailing list that is open to all members, and "mostly filled with irrelevant opinions, which is what being a collective is about — throwing ideas up among like-minded people". Topics of discussion on the list range from 'Did man really land on the moon?' to 'Sydney buses need a ring circuit route rather than a central hub system'. Some groups, such as Perth Clan, also have their own lists so they can discuss preparations for events without clogging up the main list.



The meetings and the mailing lists help artists share resources and form their own collaborations. "I've just finished doing a videoclip for Atone, but I need to borrow a mini DV camera from another Clan member. Then I need another member to do a Beta SP dub for it. Without these connections, such things wouldn't be possible without a lot of money. The group email list is great for this sort of thing because any problems can be posted out to everyone and you'll usually get quite a few answers or offers of help."

## Out now

Clan Analogue has a couple of recent releases out at the moment. *Cognition 3* is the third release in Clan's dance-orientated series, which showcases the cutting-edge work of its artists. Deep Child's *Hymns of Babylon*, the third in the "grossly underpriced individual artist maxi EP series", is also available (CDs in this series cost $15.50).



Atone also has a CD ready for release. "Atone has a reputation for delivering fantastic downbeat grooves with a dubbed-out flavour. Hopefully this CD will also include an MPEG videoclip or two on the disc for playback on your computer, as did The 5000 Fingers of Dr T's *Buttsqueezer* CD."

*Jasper is a member of The 5000 Fingers of Dr T, which featured in the first Random Notes column (see* APC *July 2000, page 192). Four videoclips from Dr T are on* APC*'s October 2000 cover DVD.*

***Vanessa Richardson***




The following 10 Clan Analogue tracks are included on *APC's* cover CD.

- $oolie: 'Catch 22'
- Atone: 'Hole in My Shoe'
- Carrier: 'Cold'
- Deep Child: 'Yak Secret Tech'
- The Futile Sound of Brunswick: 'Limited Demonstration of War'
- Mode: 'Ulterior Connection'
- Myrtle: 'Not Quite Here'
- Null Object: 'Metal'
- Pempek: 'Flutes'
- Upsyndrome: 'Robots!'

This month's videoclip is 'Rachel's Meadow' from Deep Child. It has a squelchy sound, and flows with a fuzzy urban groove. You'll find it in the Random Notes section of CD 1.

All current Clan Analogue releases are available through Festival at good record shops or online through ChaosMusic. The complete Clan Analogue catalogue should be available from the new CrispyDisc site (crispydisc.com) by this month.

**These tracks and the videoclip can be found on CD 1 of this month's cover CD pack, along with profiles of the artists. For more information on Clan Analogue, visit www.clananalogue.org.**

# Big game hunting

*For many people, gaming isn't a pastime, it's a lifestyle. These gaming sites have all the inside gossip, reviews and interviews committed gamers crave.*

## Combat Flight Center

One of the best aspects of the Web is the range of fan or enthusiast-based sites. Created by people with a genuine love of the subject matter, these online communities allow like-minded individuals to share information. If you happen to have a penchant for PC flight simulations, then Combat Flight Center will be just your cup of tea. Developed by rabid simulation fanatics, this slick site includes previews, reviews, news, files, FAQs, hints and loads of message boards.



**Online** www.combatfs.com
**Rating** ■■■■■■■■■□

*Julian Schoffel*

## Game Rankings

Game Rankings is a great cross-referenced archive for computer and video gamers. It gives you an average score taken from online reviews for just about every game that's been released in the last few years. Game Rankings has a run-down on each game with links to sites that have reviewed it, an average user rating (anyone can vote) and a variety of ways to sort games statistically to find exactly the information you're looking for. Very handy.



**Online** www.gamerankings.com
**Rating** ■■■■■■■■■□

*Daniel Gardiner*

## Games Domain

Don't you hate it when a Web site publishes a favourable review of a really dreadful game and then bombards you with banner ads for the same product? Thankfully, Games Domain doesn't do this. Run by enthusiasts rather than full-time journalists, Games Domain features a massive archive of previews and reviews, often with second opinions. The huge demo library is frequently updated and even contains links to Australian download mirrors. An excellent site.

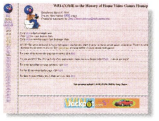


**Online** www.gamesdomain.com
**Rating** ■■■■■■■■■□

*Julian Schoffel*

## The History of Home Video Games

This site isn't pretty, but it contains a wealth of information on the history of video games. Many people may not realise that home computer games have been around for nearly 25 years in one form or another. Remember Pong? How about the old Atari 2600VCS? The History of Home Video Games lists each and every system by year, along with FAQs, links and a stack of other resources to satisfy your yearning for video gaming trivia. A must-see for any self-respecting gamer.

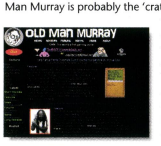


**Online** videogames.org
**Rating** ■■■■■■■■■□

*Julian Schoffel*

## Old Man Murray

Old Man Murray is an amusing site that takes great delight in poking fun at the video game industry. The centrepiece of Old Man Murray is probably the 'crate review system' article which theorises that most 3D action games can be judged according to how long it takes players to encounter their first 'crate'. The humour may be a little hit and miss, and there is some coarse language, but Old Man Murray provides a magnificent antidote to the pretentious posturing so common in the games industry.




**Online** www.oldmanmurray.com
**Rating** ■■■■■■■■■□

*Julian Schoffel*

## Through the Looking Glass

The fan community for Looking Glass Studios (LGS) is still going strong, despite the company shutting its doors some months ago. This site is now dedicated to following ex-LGS employees and their projects, such as Warren Spector at Ion Storm Austin and Ken Levine at Irrational Games. It's also a great place to get fan-made missions for Thief and Thief 2, and you should soon see the arrival of new levels for System Shock 2 and Deus Ex.




**Online** www.ttlg.com
**Rating** ■■■■■■■■■□

*Daniel Gardiner*

## Blue's News

Blue and his team have been diligently reporting computer gaming news for years now, giving comprehensive and up-to-date information on anything even slightly related to gaming. Originally, Blues News only covered Quake and other 3D shooters, but it has branched out to become one of the best sources of news and an indispensible resource for gamers everywhere. You'll find round-ups of software and hardware, as well as all the latest gab on games already released or still under development.




**Online** www.bluesnews.com
**Rating**

*Daniel Gardiner*

## The Adrenaline Vault

The Adrenaline Vault (known as Avault) never really gets its share of the limelight, despite being one of the oldest gaming sites on the Net. Over the years it has picked up a team of highly literate, knowledgable reviewers who do a better job than their rivals on sites such as Gamespot and CNet. Unlike many other game sites that rehash already published information, Avault researches its own news stories. It's not unusual to see a site such as Blue's News or Voodoo Extreme linking to Avault for a major story.

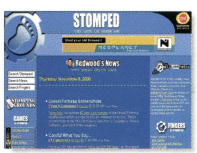



**Online** avault.com
**Rating**

*Simon Vandore*

## Stomped

A CNet affiliate, Stomped is a fan site for hard-core online gamers which boasts some of the big names from online gaming, including reviewer Allakhazam — one of the figureheads of EverQuest. Stomped first appeared in 1996 as a Quake site offering files for download and servers to play on, but as its founders' interests expanded, so did the scope of the site. Today, it provides forums and chatrooms, and hosts fan pages dedicated to specific titles. It's really become a portal site for gamers.




**Online** stomped.com
**Rating**

*Simon Vandore*

## Gamasutra

"Programmers, designers, musicians and producers of the industry unite! Pool your talents. Embrace challenge. Create superior games." This is Gamasutra's challenge. Gamasutra.com complements the exemplary *Game Developer* magazine, and offers all manner of articles written by people passionate about their chosen craft. The site's highlight is the fascinating Post Mortem series, where game developers discuss the merits and failures of their games after release. Gamasutra is an essential stopover for all who appreciate the art of game creation and want to know more about it.

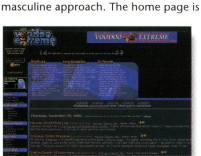



**Online** www.gamasutra.com
**Rating**

*March Stepnik*

## Voodoo Extreme

Voodoo Extreme's bold declaration that it is almost as much fun as "your second circumcision" suggests a rather masculine approach. The home page is in no way user friendly; there are jumbled text borders and the equivalent of about 50 screens of text to scroll through in the main window. However, make no mistake; this site is by and for hard-core gamers. Looks aside, Voodoo Extreme is bursting at the seams with content. Check it out for yourself.




**Online** www.voodooextreme.com
**Rating**

*Guy Hungerford*

## Happy Puppy

Happy Puppy claims to be the first commercial game site. It was launched in 1995 and since that time many similar sites have popped up across the Web. Happy Puppy doesn't offer much that's different from other gaming sites. However, it has a broader gaming focus, which is a very welcome approach. The site covers all game genres and has reviews, preview scoops and news. Instead of focusing only on the PC, Happy Puppy has sections for Mac, Nintendo 64, PlayStation and PlayStation2, Dreamcast, Web games and handhelds.




**Online** www.happypuppy.com
**Rating**

*Darren Ellis*

# Your e-horoscope: It's all good

*Not sure what the year ahead will bring? Using the latest in computer-aided astronomical technology and a hefty dose of guarana, Chip Chat predicts how technology will influence your life in 2001.*

## Aries
**Mar 21 — Apr 20**



Aries are stubborn, pig-headed and unwilling to admit that they're wrong. Have you considered working in a corporate IS department or on a software support line?

## Taurus
**Apr 21 — May 21**



Despite your innate grace, you will accidentally spill coffee all over your keyboard, causing the letter 'o' to stop working. Hwever, this will nt cause any bvius prblems.

## Gemini
**May 22 — June 21**



Naturally, as a Gemini, you are using a dual-boot system. This year, why not go the whole hog and get a multiprocessor PC or a series of high-performance clusters?

## Cancer
**June 22 — July 22**



A fortunate conjunction of celestial bodies bodes well for a positive future in the areas of romance and wealth. However, Windows 98 still won't be stable.

## Leo
**July 23 — Aug 23**



When the government decides to pick someone as a test case on the use of Napster, it's your 10G MP3 collection they're thinking of. Lions are ferocious so you might enjoy the battle, but take our advice and get a lawyer.

## Virgo
**Aug 24 — Sept 22**



You will score with the ultimate object of your fantasies in a romance chatroom, but your usual perceptiveness will fail you and when you meet in real life your wildest fantasy becomes your worst nightmare.

## Libra
**Sept 23 — Oct 23**



After pressure from various online groups, the name of your star sign will be changed to Linux. Your balanced outlook will help you through this upheaval, but be ready to update your kernel regularly.

## Scorpio
**Oct 24 — Nov 22**



A flexible knowledge management strategy will reap dividends for effective use of low-cost transaction processing. OK, we admit it, that one was just made up.

## Sagittarius
**Nov 23 — Dec 21**



Always fond of a challenge, you were one of few in Australia who managed to get their hands on a PlayStation2 before Christmas. Preparing for the burglars will also be a welcome adventure.

## Capricorn
**Dec 22 — Jan 20**



In a New Year frenzy, you'll abandon your usual down-to-earth approach to life and exceed the download limit for your ISP. Get ready to grovel or your account will be cancelled.

## Aquarius
**Jan 21 — Feb 18**



Overclocking could be risky, even for a level-headed Aquarian like yourself. Instead of beefing up your PC, why don't you try eating some vegetables for a change?

## Pisces
**Feb 19 — Mar 20**



Always optimistic, you decide to change the laser cartridge. Unfortunately, you'll end up with powdery black stuff all over your hands, which will eventually lead to your dismissal.

# "If someone tells you it takes only 5 minutes to install up to 240GB on the network, DON'T BELIEVE IT."



**Ease of Use**
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- Automatic recognition of network types/clients
- Supports DHCP, BOOTP and RARP
- Configuration via Web browser

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- Easily supports 100 or more clients

**Compatibility**
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**Network Backup**
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**Network Security**
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**Guarantee**
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## "I did it in 43.55 seconds."
### Don Knisley, Network Engineer, US Air Force

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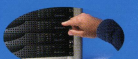




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2 Connect to Ethernet hub



3 Turn Snap Server on

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